AN ARCHAEOLOGICAL EVALUATION OF SOUTH PULPIT SHELTER (26Hu2472), EASTERN BLACK ROCK DESERT, HUMBOLDT COUNTY, NEVADA

by

Dave N. Schmitt
Michael P. Drews
and
Robert G. Elston

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Modified South Pulpit Rock Shelter Test Excavation

Prepared by
Intermountain Research
Drawer A
Silver City, Nevada 89428

under the direction of
Robert G. Elston, Principal Investigator

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ABSTRACT

In September 1987, Intermountain Research conducted archaeological test excavations at South Pulpit Shelter (26Hu2472) to evaluate its research potential and its eligibility for nomination to the National Register of Historic Places. Limited subsurface excavation discovered hearth-like features, groundstone, perishable artifacts, floral and faunal remains, and numerous lithic tools, including battered cobbles, bifaces, and choppers, as well as the debitage generated by their manufacture.

The artifacts suggest the shelter served as a Mid to Late Archaic base camp (ca. 3200-600 B.P.) where locally available lithic raw materials were reduced. Through the analysis of faunal remains, plant macrofossils, pollen, and artifactual remains, South Pulpit Shelter demonstrates potential for addressing regional research concerns that include changes in prehistoric human subsistence and technology, particularly during the Early and Late Archaic periods, and the paleoenvironment and biogeography of the Black Rock Desert. The shelter is considered eligible for nomination to the National Register of Historic Places.

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ACKNOWLEDGEMENTS

Project design and direction, and lithics analyses, were the responsibility of Robert Elston, Principal Investigator. Dave Schmitt, Project Supervisor, supervised the day-to-day conduct of the post-field effort, conducted collections analyses, and served as principal report author. Michael Drews addressed site stratigraphy and drafted the maps and graphics appearing herein; Elizabeth Budy prepared the photographic plates. Cashion Callaway served as project manager and copy editor, and Katherine Nickerson produced the report.

The field team included Elston, Schmitt, and Drews, assisted by Susan Davis, Bruce Jones, and Allen McCabe. Bureau of Land Management field observers included Joan Lilley, Contract Officer; Peggy McGuckian, COR; Lynda Armentrout, State Archaeologist; Regina Smith, Winnemucca District Archaeologist; and Diane Colcord, Graphics Specialist.

INTRODUCTION

South Pulpit Shelter (26Hu2472) was discovered and recorded by Intermountain Research personnel in 1986, during reconnaissance of a proposed gold mine development (Elston 1986a). The site is a multi-chambered rockshelter/cave approximately 11 meters long and 3 meters deep, lying 8 meters above the highest developed beach of ancient Lake Lahontan, on lands administered by the Bureau of Land Management, Winnemucca District. When recorded, the shelter appeared to contain between five and ten meters of sediments, suggesting a potential for prehistoric occupation dating to the end of the Pleistocene.

The Bureau of Land Management contracted Intermountain Research to conduct a limited testing program to assess the research value of the site, and its significance in terms of its eligibility for nomination to the National Register of Historic Places. The evaluation focused on four primary tasks:

1. check for the presence of buried cultural remains, particularly preserved organic materials and/or burials;

2. check for the presence of paleoenvironmental data;

3. obtain materials suitable for radiocarbon dating; and

4. observe the stratigraphic record and its potential for chronological separation of occupational events, cultural phases, and paleoenvironmental phenomena.

Further, site function was to be addressed through the analysis of assemblage composition and artifact diversity.

This report details the results of the work. Presented in eight chapters, the first four provide general descriptions of the environmental and cultural settings, research expectations, and study methods. Chapters 5 and 6 describe artifacts, and animal and human remains, while stratigraphy and artifact distributions are discussed in Chapter 7. The final chapter presents conclusions and site management recommendations.

Chapter 1. AREA AND ENVIRONMENTAL SETTING
by Michael P. Drews and Robert G. Elston

The study area is located on lower slopes of the Kamma Mountains overlooking the Black Rock Desert (figures 1 and 2), in Township 35N, Range 29E, Section 24, NW/SW/4 (BLM Eugene Mts., Nev. 1:250,000). The Black Rock Desert, presently the sink of the Quinn River, is a valley about 1200 m (3940 ft) above sea level, lying between dry mountain ranges rising 2000 to 2700 m (6562 to 8851 ft).

Climate

The climate in the Black Rock is dry, with annual precipitation at Sulphur averaging only 12.4 cm, most of which falls in the winter and spring. Summer thunderstorms occur, but fail to provide significant precipitation (Houghton et al. 1970). The nearest permanent source of surface water, is Sulphur Springs, 3.0 km southwest if the project area.

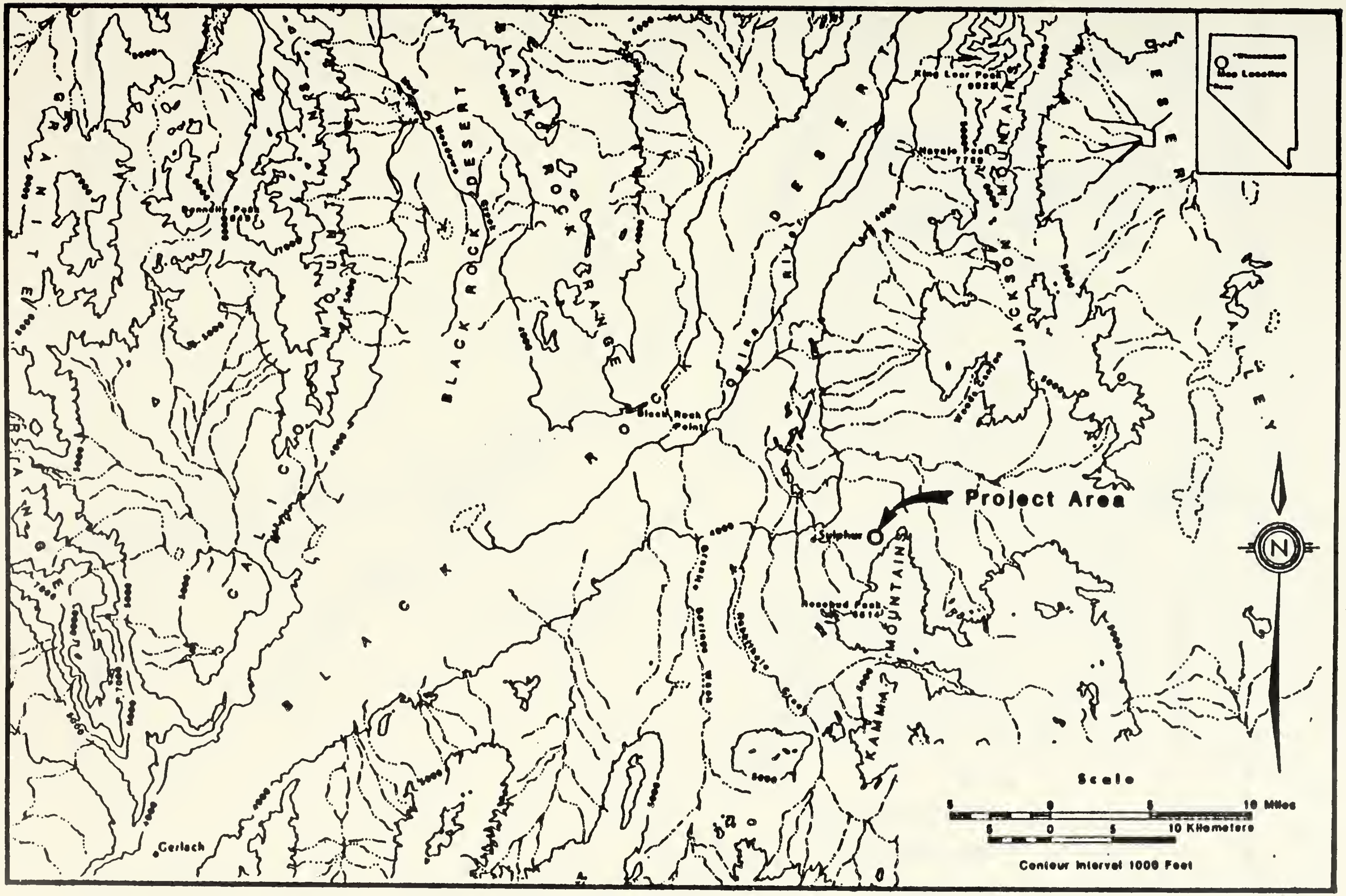
Vegetation

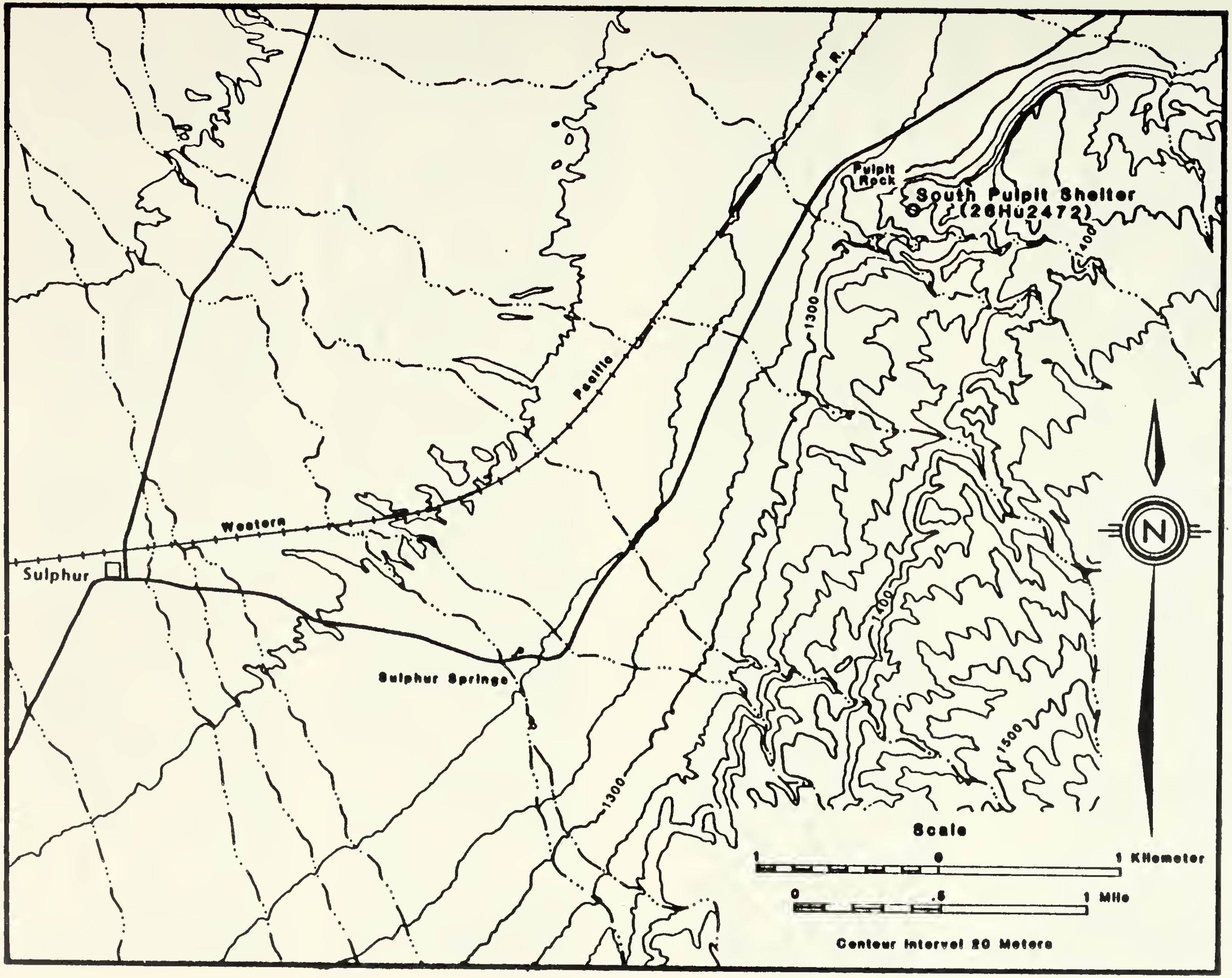
Much of the Black Rock is true desert, devoid of any plants. However, the project area is covered by desert shrub communities. Those dominated by greasewood (Sarcobatus baileyi) and saltgrass (Distichlis stricta) occur on salt flats around Sulphur at elevations below about 1219 m (4000 ft). Within the more localized project vicinity, plant communities are dominated by spiny hopsage (Grayia spinosa), with understories of round-leaved pepper grass (Lepidium perfoliatum), and/or cheatgrass (Bromus tectorum). Wyoming big sagebrush (Artemisia tridentata wyomingensis) occurs in some drainages, including that below the shelter. Other major shrub species in the area include budsage (Artemisia spinescens), green rabbitbrush (Chrysothamnus vicidiflourus), and littleleaf horsebrush (Tetradymia glabrata). Grasses and forbs include Sandberg bluegrass (Poa sandbergii), squirreltail (Sitanian hystrix), desert needlegrass (Stipia speciosa), prickly gilia (Leptodactylon pungens), and prince's plume (Stanleya pinnata) (Hycroft and Resource Concepts 1986).

Fauna

Several species of songbirds, reptiles, and small mammals inhabit the project vicinity. These include horned larks (Ecremophila alpestris) and black throated sparrows (Amphispiza bilineata), Great Basin fence lizard (Sceloporus

Figure 1. Project vicinity map.


Project Area
Sulphur
Black Rock Point
BLACK ROCK DESERT
BLACK ROCK RANGE
JACKSON MOUNTAINS
KAMMA MOUNTAINS
CALICO MOUNTAINS
GRANITE RANGE
Gerlach
Map Location
Scale
5 0 5 10 Miles
5 0 5 10 Kilometers
Contour Interval 1000 Feet


South Pulpit Shelter
(26Hu2472)
Pulpit Rock
R. R.
Pacific
Western
Sulphur
Sulphur Springs
1300
1400
1500
N
Scale
1 Kilometer
1 Mile
Contour Interval 20 Meters

occidentalis), sagebrush lizard (Sceloporus graciosus), leopard lizard (Crotaphyus wislizenii), antelope ground squirrel (Spermophilus leucurus), Great Basin pocket mouse (Perognathus parvus), Ord's kangaroo rat (Dipodomys ordi), Great Basin kangaroo rat (Dipodomys microps), and wood rat (Neotoma sp.). Somewhat larger mammals in the vicinity include black-tailed jackrabbit (Lepus californicus), badger (Taxidea taxus), and coyote (Canis latrans). Pulpit rock, located 400 meters north of the shelter, is a known nesting eyrie for the prairie falcon (Falco mexicanus) (Hycroft and Resource Concepts 1986).

Geology

The Kamma Mountains consist of Triassic and Jurassic limestones overlain by Tertiary sedimentary and volcanic rocks. The volcanics include intrusive and extrusive basalt, rhyolitic flows and tuffs, dacite and felsite plugs and dikes. The sedimentary rocks include shale, tuff, sandstone, diatomaceous rocks and pebble conglomerate. In the project area, most rocks are water-laid tuffs (Lincoln 1923:103). In the northwestern Kamma Mountains, particularly in the project vicinity, silicification and mineralization of these rocks has occurred through hydrothermal activity.

Geomorphology

The northwest slopes of the Kamma Mountains form a series of step-like land forms, or benches, with steep (slopes average 30%) risers of exposed bedrock sometimes thinly mantled with colluvium, and relatively broad, flat surfaces covered with alluvium. Local intermittent stream action has eroded short, steep-walled ravines in the risers, usually heading in bedrock cliffs to form waterfalls. Coalescing alluvial fans, formed on the valley floor below the riser of the first bench, cover the surface of the bench. The alluvium often grades into colluvium just below the risers.

South Pulpit Shelter is located along the southern face of "a prominent cliff of [silicified] pebble conglomerate in which the pebbles are mainly volcanic material" (Willden 1964:105). This cliff is a wave-cut scarp, and Pulpit Rock, located 400 m north of the site, represents a sea stack isolated by high stands of Pleistocene Lake Lahontan. Lahontan levels began to retreat from its maximum high stand of 1335 m (4380 ft) about 13,000 years before present (B.P.) (Davis 1982:60). The high shoreline is marked by wave-cut cliffs and beach deposits of gently sloping gravels.

Lake Lahontan levels fluctuated widely 12,500 to 11,000 years ago, but probably receded to 1230 m (4035 ft - the elevation of present-day Sulphur) by 11,200 B.P., and maintained shorelines at about 1220 m (4000 ft) in separate basins for a considerable period between 11,000 and 9,000 years ago. After 9,000 B.P., the basins of Lake Lahontan achieved essentially modern conditions.

The Lahontan shoreline in the project area provides a benchmark for estimating the age of particular land surfaces. The oldest surfaces are found on ridge tops along the margin of the second bench, far above the Lahontan maximum high stand.

Next in age is the Pleistocene alluvium on the surface of the first bench, which has been dissected into a series of ballenas. These older surfaces are armored with a desert pavement of angular gravel. The wave-cut scarp of the Lahontan highstand truncates this alluvium, and bar and beach deposits are inset into it; the latter features are armored with desert pavement of rounded gravel. Younger Holocene alluvium is sometimes inset into, and sometimes overrides, both the Pleistocene alluvium and the beach deposits on the first bench.

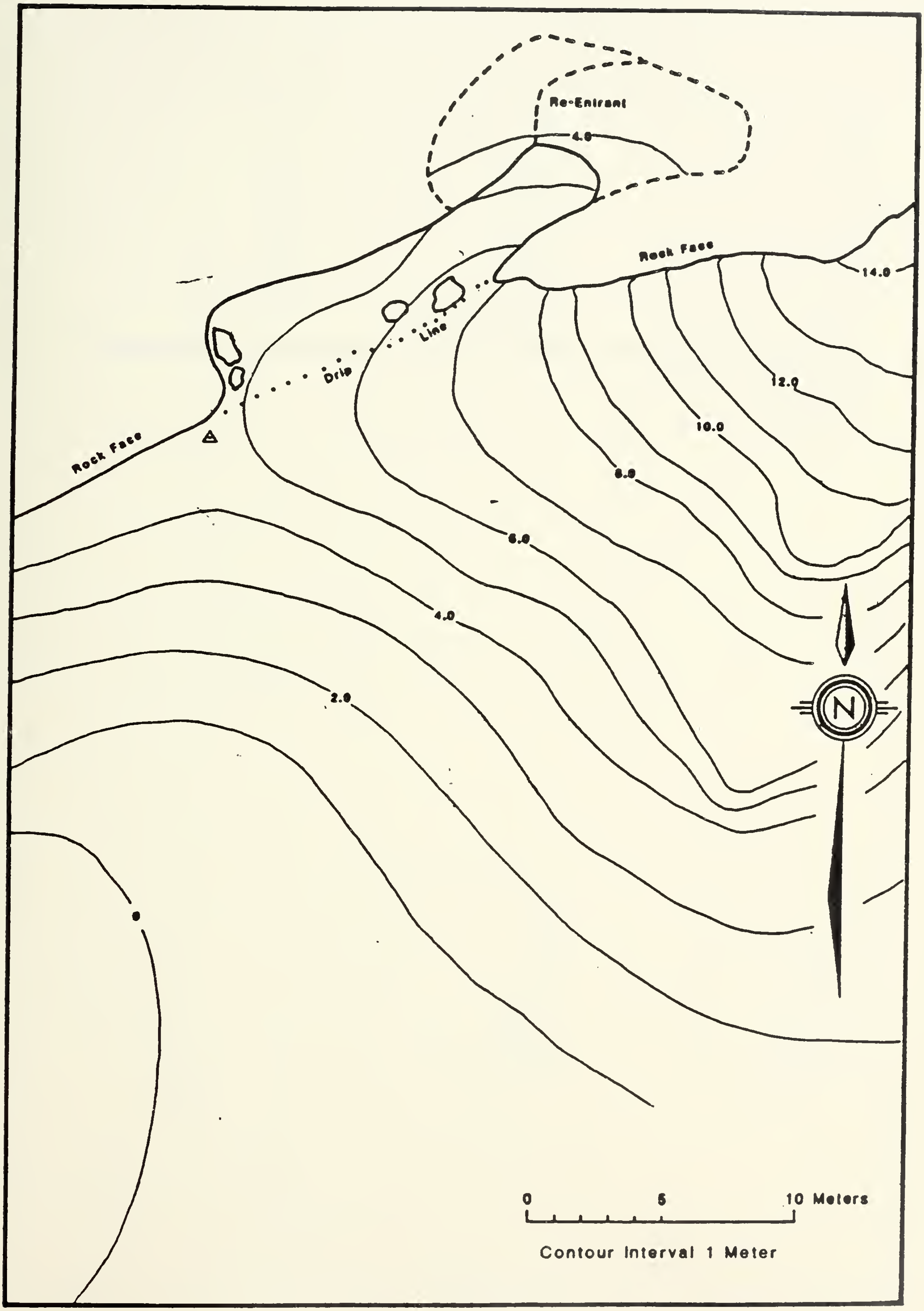
Site Description

South Pulpit Shelter is a south facing, multi-chambered rockshelter/cave in a 20 m high wall of cherty rock (Figure 3). An opening in the cliff wall (11 m long, 3 m deep, 3 m high) forms the main shelter area. A cone of rocky colluvium encroaching from the east fills most of the shelter and partially buries openings to two interior chambers. One is a 40 cm high re-entrant east of the main shelter, and another 20 cm high enclosure extends north from the bank wall. Colluvial intrusion and constricted height of the re-entrants are illustrated in Figure 4.

The extent of colluvial intrusion into the re-entrants, and surface elevations 1 meter below that of the western portion of the shelter, suggest the shelter opening may have been higher and wider at one time. Observing the intersection of profiles 4 and 5 in Figure 4, colluvium is deepest and appears to have sealed off a portion of the shelter opening along the eastern cliff face. Similar re-entrants buried by colluvium now may undercut the rear wall of the shelter.

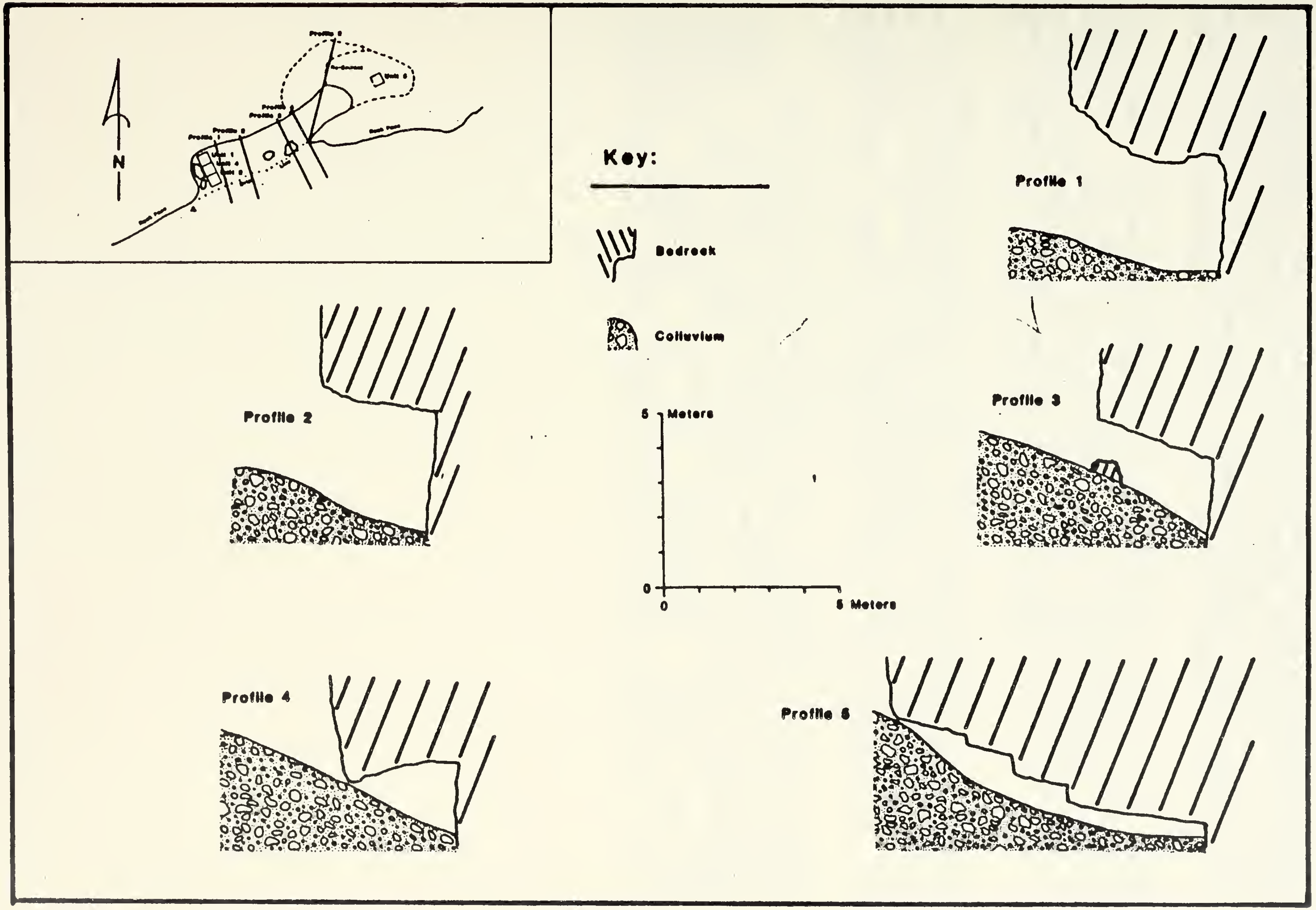
The shelter lies at the Lahontan high stand of 1335 meters (ca. 4380 feet) and may have been created by wave action and subsequent weathering along a zone of weak rock. A

Figure 3. Site map, South Pulpit Shelter (26Hu2472).



Re-Entrant
4.0
Rock Face
14.0
Drip
Line
Rock Face
12.0
10.0
8.0
6.0
4.0
2.0
0
N
0
5
10 Meters
Contour Interval 1 Meter

Figure 4. Cross-sections of South Pulpit Shelter.


N
Key:
Bedrock
Colluvium
Profile 1
Profile 2
Profile 3
Profile 4
Profile 5
5 Meters
0
0
5 Meters

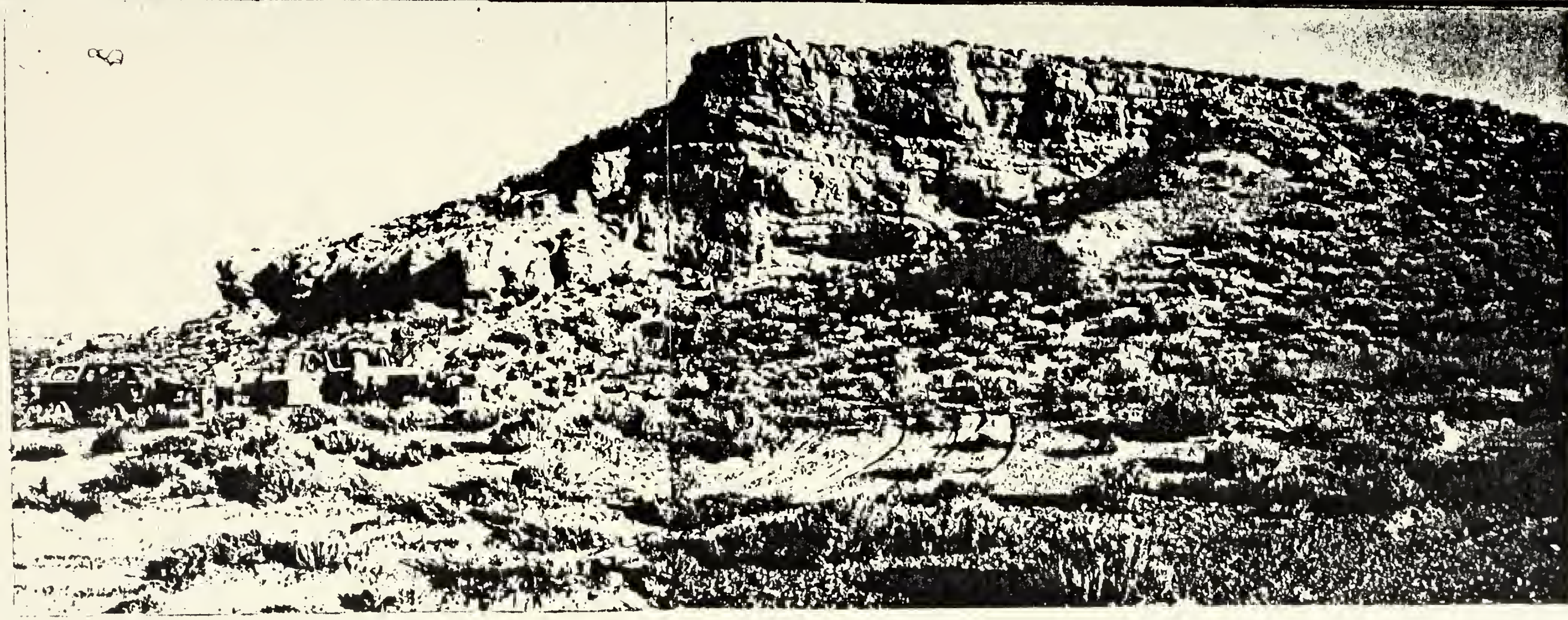
more resistant rock formation just east of the shelter forms a low ridge that appears to have protected the larger cliff face to the east from significant wave cutting (Figure 5). At the same time, the formation created a small cove where wave action and erosion of the shelter chamber were intensified.

Wave action probably kept the base of the cliff face relatively free of debris during the high stand of Lake Lahontan. As lake levels receded, the cliff face continued to weather, creating a series of colluvial slopes along the base of the escarpment. The colluvial slope east of the shelter is the largest of these features and completely fills the area of the older cove as well as the shelter itself.

Colluvial debris presently caps the shelter deposit, with average slopes near 50%. The more gentle slopes near the toe of the colluvium probably provided the most suitable living surfaces. As the colluvium advanced into the shelter, an increasingly smaller area along the western portion of the shelter would have been available for use (Figure 6).

The present surface of the inner chambers lies one meter below the lowest present surface elevation of the shelter proper, indicating that colluvial deposition in the re-entrant ceased some time ago. Roof fall and colluvial deposition continue to occur in open portions of the shelter. Thus, cultural deposits on the re-entrant floor may be contemporaneous with those from at least one meter below surface in the flattest, open portion of the shelter.

Figure 5. South Pulpit Shelter, view north.



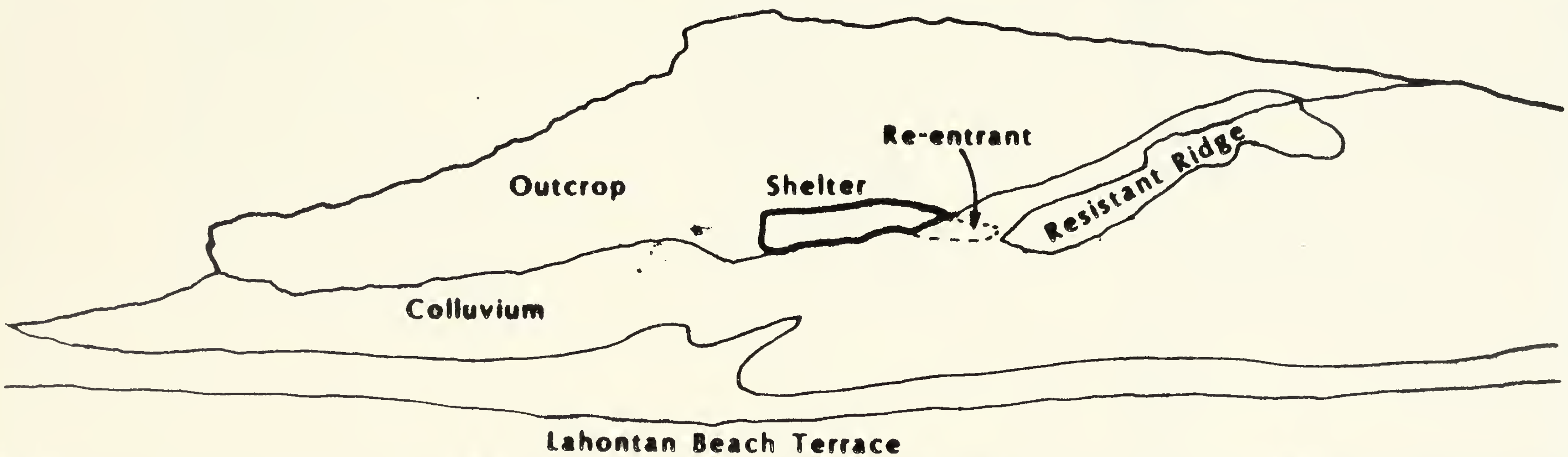
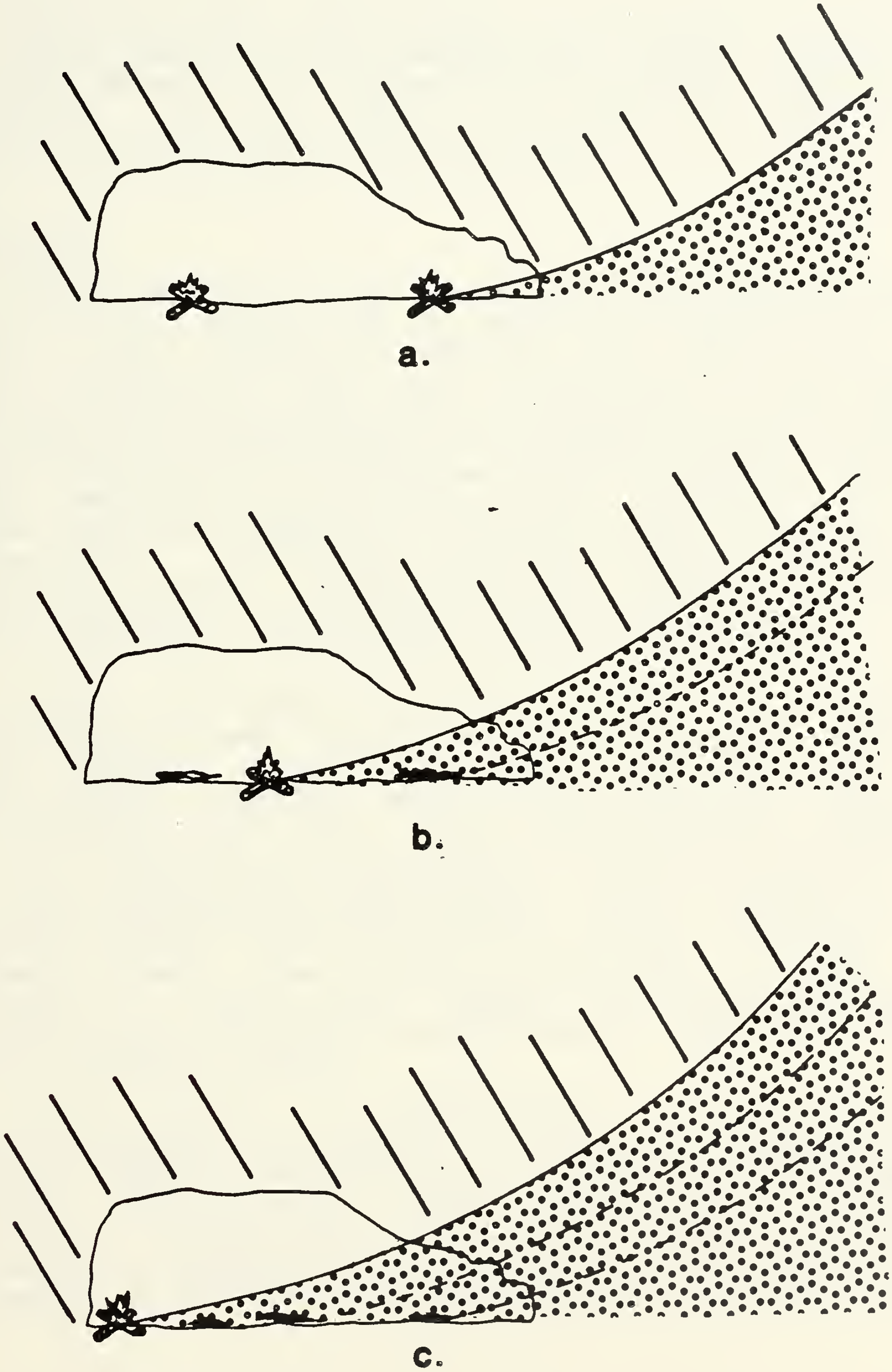

Re-entrant
Outcrop
Shelter
Resistant Ridge
Colluvium
Lahontan Beach Terrace

Figure 6. Effects of colluvial deposition on suitable living surfaces at South Pulpit Shelter.


a.
b.
c.

Chapter 2. CULTURAL SETTING
by Dave N. Schmitt and Robert G. Elston

The prehistory, ethnography, and history of the project area have been outlined recently by Elston (1986a). The regional prehistory is merely summarized in the following discussion, as are details of previous archaeological investigations in the project vicinity.

Prehistory

The prehistory of the region has been detailed by Elston (1982, 1986a, 1986b), Lohse (1980), and Smith et al. (1983). Briefly, the prehistoric record of the Black Rock Desert begins sometime in the late Pleistocene or early Holocene prior to about 9000 years ago. The pre-Archaic cultures of this period were highly mobile and possibly hunted large game, perhaps such extinct species as mammoth, camel, and horse. Lithic technology was based on the manufacture of large bifaces and the production of blades and side-struck flakes (Elston 1982). Projectile points of the pre-Archaic are collaterally flaked, concave-based and stemmed (e.g., Clewlow 1968). Extensive pre-Archaic sites are located in former marsh areas along Jackson Slough and the Quinn River.

During the Early Archaic (7000 - ca. 3500 B.P.), the climate became more xeric than in pre-Archaic times, with higher annual temperatures and a decline in winter precipitation. Although all habitats were exploited, large Early Archaic sites are located near permanent springs and streams, reflecting the importance of surface water during the hot, dry climate of the Altithermal (see Elston 1982). Stone tools are characteristically smaller, with collateral flaking patterns replaced by diagonal or random flaking. Seed processing tools (manos and metates) begin to make their appearance in significant numbers in the Early Archaic. Diagnostic artifacts are represented by Pinto and Humboldt series projectile points.

The Mid-Archaic (ca. 3500-1500 B.P.) in the western Great Basin is marked by a decline in annual temperatures and increased winter precipitation. This period marks the most intensive occupation of the Black Rock Desert (Elston and Davis 1979), coinciding with an increase and expansion of available resources created by an intermittent shallow lake/marsh in the Black Rock Desert playa (cf. Elston 1982).

Mid-Archaic archaeological sites reflect this favorable climatic regime in the complexity and richness of recovered assemblages, including a variety of textiles and other perishable artifacts, stone sculptures, and evidence of craft specialization (Elston 1982). Elko series projectile points are the most widespread diagnostic artifact of this period.

Sites spanning the Early Archaic to 1000 B.P. in the Black Rock Desert have been excavated at Trego Hot Springs (Seck 1980) and Barrel Springs (Cowan 1972).

During the Late Archaic (1500 B.P. - historic contact), the climate became warmer and drier. Subsistence changes are reflected in a greater emphasis on plant foods and small game, and a decrease in big game hunting (cf. Smith et al. 1983). Technological changes include replacement of the atlatl with the bow and arrow, various mortar forms are added to the mano and metate for plant food processing, and the introduction of pottery (Elston 1982). Diagnostic artifacts include Eastgate and Rosegate series points (1500-800 B.P.), and Desert Series points and pottery (after 800 B.P.).

Ethnography

The project lies within lands occupied historically by bands of Northern Paiute people. The west margin of the annual range used by the Kupadokadops (ground squirrel eaters) band encompasses the study area, which also may have been used by the Kamodokadops (jackrabbit eaters) and Sawawaktodo tuviwarai (sagebrush mountain dwellers) bands (Stewart 1939).

In general, these bands followed a hunting-gathering lifeway based on the seasonal availability of various plant and animal resources.

Previous Archaeological Research

Several small scale archaeological surveys have been conducted in the vicinity of the project area. In 1976, Dennis Simontacci surveyed drill pads for 11 temperature gradient holes in and around Sulphur (BLM CR2-64[N]). In 1981, Mark Hermiston examined 12 more drilling locations in the Sulphur Springs drainage south of the project area (BLM CR2-556[N]). No cultural resources were observed by either survey.

Peggy McGuckian and Mark Ziegenbein surveyed 228 acres adjacent to the present project area on the north and east in 1984; again, no cultural resources were recorded (BLM CR 929[N]). Also in 1984, McGuckian surveyed 400 meters along the road from Sulphur Springs to a mine area east of town (BLM CR 2-934[P]), observing two isolated prehistoric artifacts (one white chert flake; one obsidian biface), and the remains of a wooden bridge once crossing the runoff from Sulphur Springs. In 1986, McGuckian surveyed 17.5 acres proposed for minerals exploration (BLM CR 2-2032[P]). The area surveyed lies along the east-west drainage south of South Pulpit Shelter. McGuckian found the area to have been disturbed heavily by modern mining. However, she noted several outcrops of cryptocrystalline silicate (CCS) rock in the slopes along the southern margin of the drainage, and recorded CCS debitage littering the slopes below the outcrops and in the drainage bottom as aboriginal lithic quarry site CrNV-22-3571. Although no blanks or other flaked stone tools were observed, six possible hammerstones were collected from the site. The quarry area is 300 meters south of South Pulpit Shelter.

During the reconnaissance of the proposed Crofoot Mine that led to the discovery of South Pulpit Shelter, Elston (1986a) recorded an additional 14 sites: 8 were isolates or small, non-descript sites; and 5 were prehistoric quarries, workshops, or residential bases. One site was an historic mining camp.

Elston (1986a) concluded that, under present environmental conditions, long term occupation of prehistoric sites along the western slopes of the Kamma Range would have been difficult. Plants of known economic value to aboriginal people are scarce and the area appears to suitable habitat for large game animals, except perhaps, antelope. Prehistoric sites in this area are relatively small in size and lack midden accumulations and residential features expected in long term base camps; with the exception of a single possible mano, plant processing tools were not observed and obvious hunting tools, such as projectile points, were rare.

Of all the prehistoric sites discovered during the Crofoot Mine reconnaissance (Elston 1986a), South Pulpit Shelter seemed to offer the most potential for scientific inquiry. The site appeared to have a deep deposit, and therefore could contain a long paleoclimatic record, possibly dating back to the terminal Pleistocene. The site was also the most likely candidate for a residential base; south facing and warmed by the sun, yet providing some protection from the prevailing southwest winds. There is presently no permanent water near

the shelter (Sulphur Spring in 3.4 km southwest), but conditions may have been more mesic in the past (Davis and Elston 1972; Davis 1982).

A major resource in the Kamma Range available to prehistoric people was the abundant siliceous rock suitable for the manufacture of stone tools. All of the sites discovered during the Crofoot Mine reconnaissance (Elston 1986a) contained evidence of lithic procurement, processing, and/or tool manufacture.

South Pulpit Shelter lies only 300 meters north of site CrNV-22-3571 and 500 meters northeast of site CrNV-22-3741 (Elston 1986a). Both are prehistoric lithic quarries, although neither exhibits quarry pits or other signs of intensive lithic production seen at the Lake Range Quarry on the San Emidio Desert (Pedrick 1985) or the Tosawihi Quarries north of Battle Mountain (Rusco 1982; Elston et al. 1987). In addition, silicified stone suitable for tool manufacture is present in the rocks forming the cliff above the shelter, and there is an extensive scatter of lithic workshop debris on the ridgetop. Only small amounts of lithic debitage and a few tools were observed on the surface of the shelter. Considering the potential for rapid deposition in the site, the paucity of cultural material on the surface seemed more likely a function of the deposition environment than lack of prehistoric occupation at the site. Thus, South Pulpit Shelter offered the potential for learning more about lithic processing and manufacture, as well as changes in lithic technology through time.

Chapter 3. RESEARCH EXPECTATIONS
by Dave N. Schmitt

Archaeological investigations of caves and rockshelters in the Great Basin have provided a wealth of prehistoric subsistence and paleoenvironmental data, often spanning thousands of years of occupation. Deep caves and rockshelters were used as residential bases, short term camps, locations to cache goods and equipment, and/or for human burials (e.g., Aikens 1970; Basin Research Associates 1986; Elston and Budy 1987; Hattori 1982; Orr 1956; Thomas 1983a).

At South Pulpit Shelter, few surface artifacts were present (Elston 1986a), but the geomorphology suggested depositional rates might be high and substantial amounts of cultural material might lie buried beneath the surface, as was the case at James Creek Shelter (Elston and Budy 1987). South Pulpit Shelter appeared to be filled with five to ten meters of sediments which could date to the end of the Pleistocene. If these sediments were dry, we expected to recover perishable artifacts and organic remains commonly absent in open sites. Even in the absence of dry deposits, the site might contain valuable prehistoric data in cultural features and stone tool assemblages. The importance of such information is particularly significant to regional prehistory if associated with Paleoindian or the Early Archaic periods, for which there currently are little data (Elston 1986b). Further, the recovery of cultural material dating to the Late Archaic (particularly in association with Desert Side-notched points) would be important in addressing what appears to be a post 800 B.P. occupational hiatus in the Black Rock Desert.

The extent to which lithic or other resources were the focus of occupation at the shelter was unknown. Because sites recorded in the surrounding area appear to focus on lithic procurement (Elston 1986a), we suspected ample evidence of local toolstone reduction at the shelter, particularly in deposits dating to the past 2000 years when xeric environmental conditions probably offered little more than lithic resources. Since deposits at the site might date to the terminal Pleistocene and early Holocene, when the environment was more mesic, this may not always have been the case. Economic focus and function of the site is likely to have been different (e.g., exhibiting greater diversity) from those of more recent prehistoric times.

Finally, as at most caves and rockshelters (see, for example Grayson 1983), it was suspected that the shelter and re-entrant might contain large quantities of animal bone accumulated by both cultural and non-cultural processes. In particular, food refuse deposited by human occupations intermixed with woodrat (Neotoma sp.) collected bones and rodent burrow deaths (cf. Juell and Schmitt 1985) was anticipated.

Chapter 4. RESEARCH METHODS
by Dave N. Schmitt

Field operations at South Pulpit Shelter included site mapping, surface reconnaissance of the shelter and surrounding area, hand excavation of 1x1 meter units, and illustration of stratigraphic profiles. Post-field work included cleaning and cataloging recovered artifacts, analyzing cultural and faunal remains and soil samples, and processing flotation samples for recovery and analysis of charcoal and/or other organic remains. Further, a sample of obsidian tools and debitage was extracted from the collection for material sourcing.

Field Methods

Mapping

The site was mapped with transit and stadia rod from a permanent datum established near the west edge of the shelter opening. Mapping produced a 1-meter interval contour map of shelter and surrounds (Figure 7), on which are plotted excavation units, geomorphological features, and observed surface artifacts.

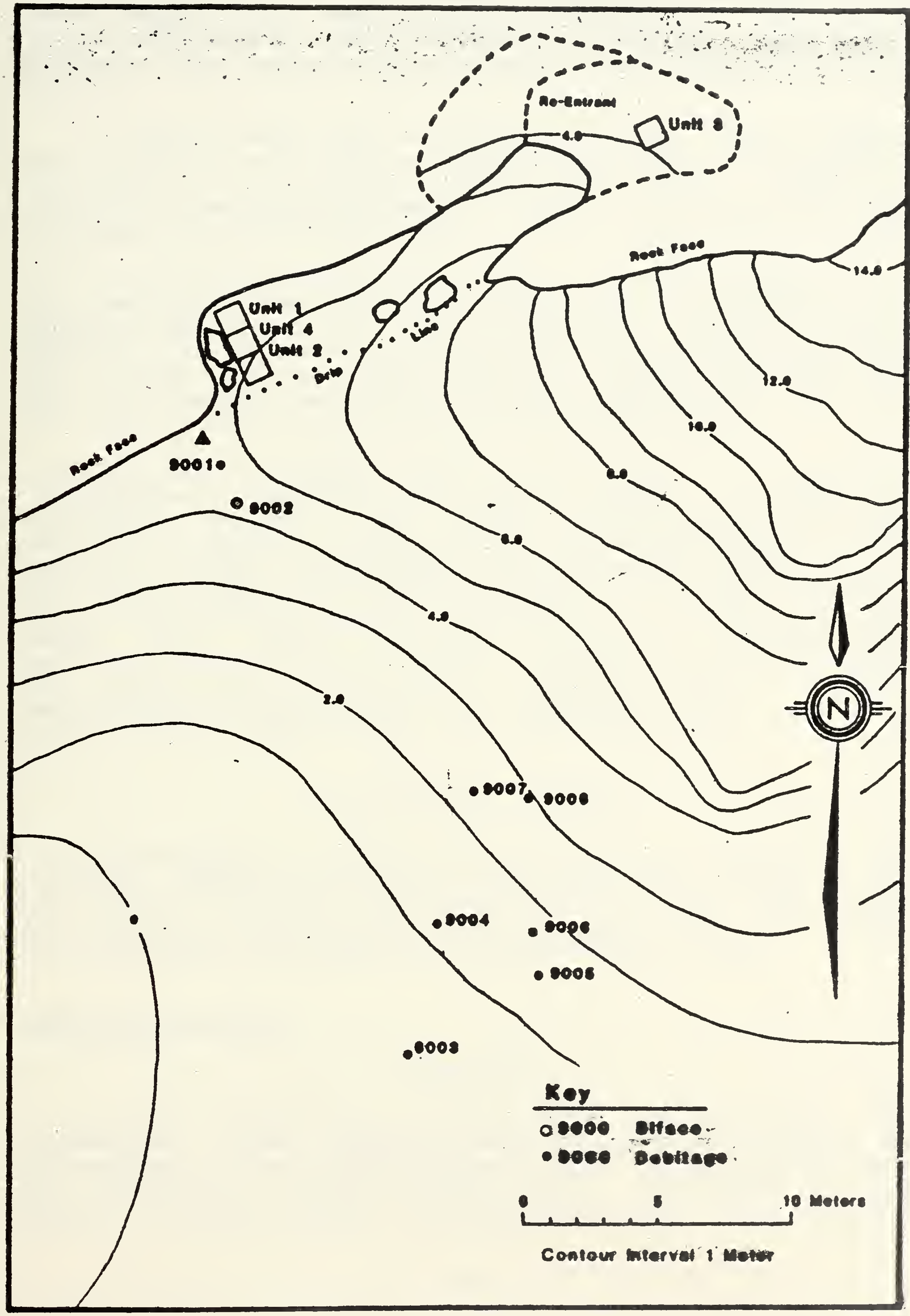
Reconnaissance

The inner and outer chambers and colluvial slope in front of the shelter were surveyed for surface artifacts. Observed artifacts were marked with pin flags, mapped (see Figure 7), and collected. Reconnaissance of the ridge top above the shelter discovered numerous flakes associated with small exposures of chert in the desert pavement. While no surface collections were made there, samples of unmodified chert were collected for comparison with lithic materials recovered from excavations in the shelter.

Test Excavation

Four 1x1 meter test units were excavated in the shelter. Three units comprised a north-south trench in the west portion of the shelter, extending from near the back wall out to the dripline (see Figure 7). Unit 1, the northernmost unit near the back wall, and Unit 2, the southernmost unit near the dripline, were opened first, both excavated to one meter below surface. The 1x1 meter block separating these units was designated Unit 4 and later excavated to 1.5 meters below surface. These units were hand excavated with shovel and trowel in arbitrary 10cm levels parallel to the surface and

Figure 7. Location of excavation units and surface collected artifacts.


Re-Entrant
Unit 3
4.0
Rock Face
14.0
Unit 1
Unit 4
Unit 2
Drip
Line
Rock Face
9001
9002
12.0
10.0
8.0
6.0
4.0
2.0
9007
9008
9004
9006
9005
9003
Key
9000 Biface
9000 Debitage
0
5
10 Meters
Contour Interval 1 Meter

screened through 1/4 inch mesh. Subsequent to excavation, three auger holes were placed in the bottom of Unit 4 to depths ranging from 25cm to 40cm below the floor. Soil matrix recovered from the auger bucket was screened through 1/4 inch mesh.

A fourth unit (Unit 3) was placed in the inner chamber (see Figure 7) and excavated in arbitrary 10cm levels parallel to the surface to a depth of 60cm below surface. Excavation in Unit 3 was accomplished by trowel, and sediments were screened through 1/8 inch mesh.

Artifacts recovered from excavations were segregated by unit and level and placed in plastic and/or paper bags with appropriate provenience data. Composite charcoal samples removed from screens were packaged in sterile aluminum foil and placed in labeled bags for later radiocarbon analysis. Bulk soil samples were removed from excavation units and from wall profiles for extraction of carbon for dating.

Excavation notes were maintained on standard Intermountain Research unit/level records. Control of artifacts, charcoal, soil samples, and recording forms was maintained using a reference number system whereby a unique reference number was assigned from a reference number log to each excavation unit level or feature. The system used at South Pulpit Shelter presents unit and level in the reference number (e.g., level 6 in Units 2 and 4 is represented by reference numbers 2006 and 4006, respectively). This number then became part of the entity's catalog number. At the completion of excavation, all test units were lined with plastic (polyethylene) sheeting and backfilled.

Stratigraphic Profiles

Stratigraphic profiles illustrating soil horizons and cultural features in selected unit walls were drawn. Soil descriptions from representative profiles follow conventions set up by the USDA Soil Survey Manual (1962) and soil colors are described using Munsell Soil Color Charts (1971).

Laboratory Methods

Catalogue

At the conclusion of field work, the collection was transported to the laboratory where materials were washed or dry-brushed, sorted, and cataloged. Each unique cultural item was assigned a unique catalog number, comprised of site number, reference number, and specimen number. When possible

and appropriate, the catalog number was applied directly to the artifact with white or black ink covered with clear lacquer. Bulk items (e.g., bone and debitage) were sorted into lots by material type, then counted, weighed, and placed in plastic bags with the catalog number on a provenience tag.

Flotation

Selected bulk soil samples were processed through an agitated water flotation system which separates light organic material (e.g., charcoal and seeds) from heavy items (e.g., mineral residue and lithics) and removes the soil matrix. The light fraction (that which floats) was passed through a series of graduated collectors: 1/8 inch screen, 1/32 inch screen, and double-thickness cheese cloth. The heavy fraction (that which sinks) was collected in 1/32 inch screen, with smaller sediments sinking to the bottom of the reservoir.

Although the flotation system is designed for recovery of small plant remains and microfauna and microdebitage, flotation was employed here to retrieve charcoal for radiocarbon analysis. Once charcoal was extracted, however, the light and heavy fraction residues were packaged and labeled separately, and curated with the collection, so that they may be considered for future analyses.

Lithic Material

A generalized, operational definition scheme was used to classify lithic raw material from the site. <u>Chert</u> is a broad classification used to describe cryptocrystalline siliceous materials. Chert of varying quality and color is present throughout the site vicinity (Elston 1986a) and comprises nearly all the tools and debitage recovered from the shelter. <u>Obsidian</u> is volcanic glass, ranging in color from black to a translucent smoky gray. Obsidian is present but rare in the excavated assemblage.

Projectile Points

Projectile points were classified on the basis of a morphological key defined by Thomas (1981). Attributes observed include length, width, thickness, and notch angles. Various ratios between morphological attributes also were observed.

Other lithic artifacts were classified according to a variety of technological, functional and morphological criteria. For instance, hammerstones and choppers are

identified on the basis of overall morphology (cobble size, subangular to tabular shape), use wear (battering), and/or cultural modification (unifacial flaking).

Biface manufacture is an optimizing strategy which maximizes the use of raw material. As discussed in Elston et al. (1987:101), the production of a flake blank and its bifacial reduction thoroughly tests the quality of raw material and reduces unnecessary weight for transport away from the quarry. It also produces a symmetrical implement with sharp but relatively strong edges that can be used as is for a variety of cutting and scraping tasks. This symmetry also facilitates maintenance (resharpening) and further reduction of the tool. Indeed, the thin, sharp flakes typically produced from such maintenance ("biface thinning") are themselves useful as general purpose tools.

Bifaces were classified by morphology and size, then further analyzed using the "stage form" concept of Muto (1971, 1976). This represents the production of bifacial cores in terms of three stages (Elston et al. 1971). <u>Stage I bifaces</u> exhibit only minimal modification. Original flake or core surfaces still may be evident on the artifact. Modification usually is oriented toward regularizing the cross section and outline in order to allow controlled thinning in subsequent reduction stages. <u>Stage II bifaces</u> are characterized by controlled thinning; flake scars usually cross the midline; and evidence of original flake or blank morphology has been obliterated. <u>Stage III bifaces</u> exhibit controlled thinning and shaping; creation of haft elements (if any) and final edge treatment are apparent.

Biface thickness to width (TTW) ratio is a useful measure of the intensity of toolstone use (Elston et al. 1987:101). Consider that the optimizing strategy for biface thinning is to detach very thin, expanding flakes that cross the midline of the piece from narrow platforms. This results in least decrease in biface width while recreating a sharp edge and rendering the tool thinner.

While thinning can occur in any stage of manufacture, it is emphasized in Stage II and later stages of reduction. However, successful (optimal) thinning in later stages requires that the proper core geometry be achieved in the earliest stage; particularly important is the thickness to width ratio. If this is too high, the curvature of one or both faces may be too great for flakes to cross the midline. In this case, each flake removal decreases the width of the piece but not its thickness, exacerbating the problem. Thus, early stage bifaces with high thickness to width ratios tend to be discarded.

We expect the TTW ratio of discarded bifaces at or near a lithic source to vary inversely with the abundance of high quality lithic raw material. Since it is usually easier to start over with a new flake blank than to "fix" mistakes, people are likely to have a low tolerance for poor core geometry when high quality toolstone is abundant; bifaces will be discarded with a relatively low TTW ratio. When high quality raw material is relatively scarce, people may continue to work with poorly formed cores and put more effort into correcting their geometry. In this situation, discarded bifaces will have a higher TTW ratio. There are data regarding thickness to width ratios for large early stage bifaces in two situations where high quality toolstone is abundant. At the Lake Range Quarry (Pedrick 1985:16), the TTW ratio for complete Stage I bifaces is .46 and .42 for stage I biface fragments. For complete Stage II bifaces, the TTW ratio is .43 and .33 for Stage II fragments. TTW ratios at Tosawihi Quarries (Elston et al. 1987:101), are comparable: .41 for complete bifaces and .37 for biface fragments.

Although all lithic debitage was counted and weighed by material type, only a sample was extracted for detailed analysis in order to assess steps in the lithic reduction continuum present at South Pulpit Shelter; this sample included all debitage (N=1530) recovered from Unit 4. Unit 4 was selected because it yielded the most debitage and represents the deepest unit excavated at the site. Each item was identified to material type and assigned to one of six debitage classes as follow:

Shatter are angular pieces of toolstone that appear cultural but lack identifiable flake morphology. Shatter most often is generated during primary reduction or by over-exposure to heat during thermal alteration.

Primary reduction flakes are those removed from the exterior of cobbles. Cortex frequently is present, and the flakes seldom have more than two dorsal flake scars.

Secondary reduction flakes are removed next. Some cortex may be present; they typically have more than two dorsal flake scars. They exhibit wide, often prepared, platforms that are perpendicular to the long axis of the flake. Pronounced, shattered bulbs of percussion are common.

Biface thinning flakes have bifacial platforms, multiple and bidirectional dorsal flake scars, and are longitudinally curved with expanding, feathered distal terminations. Biface thinning flakes may result from both Stage I and Stage II biface reduction.

Flake fragments are portions of flakes lacking sufficient morphological reference points to allow assignment to a particular reduction stage. Usually these fragments represent medial or distal portions of flakes. Flakes without platforms were classified as fragments.

Potlids are small, circular, lens-shaped flakes generated by exposure to heat, and, as such, lack platforms and bulbs of percussion.

Lithics Analysis

The specialized terminology of lithic tool production used in this report is defined below (after Elston and Juell 1987:26-27).

Heat treated, or thermally altered cryptocrystalline rocks are indicated by changes in color, luster, and fracture strength (cf. Rick and Chappell 1983). Contrasts in color and luster are easiest to recognize, along with potlids, crazing and crenated fractures, when chert has been exposed to high temperatures.

Reworking is a general term for the modification of a lithic artifact after it has been broken, expended, or otherwise abandoned, either during manufacture or use.

Recycling employs an expended tool as a core or blank for a tool of different morphology and/or function, such as a large biface used as a core for the production of flake tools.

Reuse is a kind of recycling whereby a discarded tool is recovered and employed for the same function for which it was used initially.

Scavenging is the procurement of lithic items from some previous occupation. Scavenged artifacts can be reused, reworked, and/or recycled.

Faunal Analysis

Faunal remains were identified to taxon by direct comparison with existing collections. Based on bone size and morphology, unidentified specimens were tallied according to animal size class (Table 1). All identified specimens were quantified by the number of identified specimens per taxon (NISP) (Grayson 1984).

Table 1. Bone/Animal Size Classes (after Thomas 1969).

Class I	- Mice, Shrews
Class II	- Squirrels, Gophers
Class III	- Hares, Rabbits
Class IV	- Coyote, Bobcat
Class V	- Deer, Mountain Sheep
Class X	- undetermined

Each specimen was examined for cultural and/or natural modification including evidence of burning, butcher marks (e.g., Binford 1981; Lyman 1987), carnivore gnawing (e.g., Haynes 1983), and partially digested bone from carnivore consumption (e.g., Dansie 1984; Juell and Schmitt 1985).

Specimen Photography

Lithic specimens photographed for this report were coated with a film of ammonium chloride to eliminate glare and color differences. Other specimens depicted photographically were photographed "as is".

Curation

Artifacts, catalogs, excavation notes, profile drawings, flotation samples, and photographs, accompanied by the present report, will be curated at the Department of Anthropology Museum, University of Nevada, Reno.

Chapter 5. ARTIFACT DESCRIPTIONS
by Robert G. Elston,
Dave N. Schmitt and Michael P. Drews

While the artifact collection from South Pulpit Shelter is dominated by flaked stone items, groundstone and perishable materials also were recovered. All are described in the following discussions.

Flaked Stone Artifacts

At South Pulpit Shelter, most flaked stone artifacts, and the debitage from their manufacture, are made of locally available chert (henceforward, Kamma chert). The range of colors for these materials includes white, cream, tan, and dark brown, and combinations of these; most material is translucent. Kamma chert includes high quality, flawless, isotropic material, but much of it is grainy, vuggy and/or fractured, making controlled flaking difficult. This may be mitigated somewhat by the relative ease with which flakes can be detached, making Kamma chert somewhat easier to work than less flawed material. Heat treatment of the local rock increases its vitreousness, thus improving its flaking qualities, and resulting often in a red-to-pink color change. However, the debitage also contains ample evidence (crazed surfaces, shatter with crenated breaks, and potlids) that heating the local chert often caused it to explode or lose strength.

A few obsidian tools and small amounts of obsidian debitage were recovered from South Pulpit Shelter. Color varieties include opaque black, translucent olive green, translucent "smoky" gray, translucent dark gray, and translucent gray banded, representing obsidian sources at Mt. Majuba and Pinto Peak (see Appendix B and Chapter 8, this report).

Battered Chert Cobbles

Two specimens are fragments of chert cobbles (Table 2). Each has one heavily battered edge on otherwise unmodified surfaces with cortex, suggesting their use as hammerstones or choppers; repeated battering weakened these tools, which eventually split. A bifacially flaked edge intersects the battered edge on specimen 1005-5. This specimen is made on a translucent tan, angular chert cobble with many intersecting fracture planes. Specimen 4007-7 is made on an opaque purplish gray, rounded chert cobble with smooth brown cortex.

Table 2. Attributes of Battered Cobbles.

Specimen No.	Material	Millimeters Length	Width	Thickness	gms Weight
1005-5	Chert	66.5	33.4	27.8	86.0
4007-7	Chert	64.6	48.1	41.7	82.1

Tabular Choppers

These two artifacts are made on tabular pieces of chert (Table 3) which probably are fragments of very large flakes or halves of split cobbles; both are roughly trapezoidal in plan view. Specimen 2005-2 is made of gray, opaque chert with a grainy texture and many internal fracture planes. Cortex is preserved on the two "long sides" of the trapezoid. The edge angle on the wide end is about 77°, formed in part by a few unifacial flake scars. This edge is slightly battered. Specimen 4006-1 (Figure 8a) is similar in shape, but slightly smaller. Cortex is on both long sides and one face. The wide and the narrow ends have been flaked unifacially to angles of 85° and 75° respectively, and both are battered. One long side also has been flaked unifacially, but is less worn.

Table 3. Attributes of Tabular Choppers.

Specimen No.	Material	Millimeters Length	Width	Thickness	gms Weight
2005-2	Chert	100.8	99.5	29.8	388.1
4006-1	Chert	85.3	78.5	24.8	247.0

Bifaces

Bifaces from South Pulpit Shelter come in various sizes and shapes: consider that a great deal of morphological variety stems from the fact that most artifacts in the assemblage are waste and items rejected because of poor quality material and/or mistakes in execution. As a group, large, medium, and small bifaces likely represent points on the same reduction continuum, whereas triangular bifaces and thin bifaces probably reflect variety in different biface reduction strategies.

Large Bifaces

These items represent the first stage of biface reduction, whereby the cross section and outline of the blank (usually a large flake) are regularized by percussion technique in preparation for subsequent thinning. Stage I reduction also allows the quality of the material in the blank to be tested. Since it is difficult to control the flaking process when raw material quality is poor (that with graininess, vugs, inclusions and/or internal fracture planes), items rejected at this stage tend to be misshapen and exhibit flaws.

The large bifaces from South Pulpit Shelter (Table 4) are poorly formed (have irregular shapes and a high mean width to thickness ratio of .61) and are made of low quality material. Most are made on large, thick flakes or halves of split cobbles, although specimen 2006-1 (Figure 8d) is made on a stream-rolled cobble of waxy, opaque tan to cream chert with a reddish cortex. The recalcitrance of this material is suggested by the numerous ring-cracks on the surface of the specimen, representing hammerstone blows that failed to detach flakes. Specimen 1005-7 (Figure 8b), an elongated artifact with a triangular cross section, is made of gray and purple, slightly grainy, opaque chert and has a patch of cortex on one side. A few flakes have been struck from the sides across the "bottom", and from the bottom up both sides. A flake also was removed down the keel from one end. The lateral edges are thus bifacial, but the width to thickness ratio is much too great for successful bifacial thinning. Specimen 1005-9 (Figure 8c), similar to 1005-7, is made of waxy, opaque, dark brown chert. This object originally was a large flake whose original ventral surface remains in part; a large section has broken away from one edge. Specimen 2006-4 is made of translucent brown to opaque cream, vuggy chert. It is an end fragment exhibiting unifacial flaking. Specimens 4006-34 and 4006-35 are both edge fragments from the same large biface. Similar artifacts were observed at the quarry/workshop sites recorded south of South Pulpit Shelter (Elston 1986a).

Table 4. Attributes of Large Bifaces.

Specimen No.	Material	Millimeters Length	Width	Thickness	gms Weight	Complete
1003-1	Chert	32.1	29.3	12.0	7.4	-
1005-7	Chert	114.6	48.5	39.0	210.9	+
1005-8	Chert	52.6	49.6	15.5	44.5	?
1005-9	Chert	89.7	34.4	27.1	96.3	-
2004-1	Chert	36.3	35.6	12.4	11.4	-
2005-1	Chert	32.5	37.2	16.9	19.9	-
2005-11	Chert	61.3	38.1	21.6	47.0	-
2006-1	Chert	81.9	44.7	24.6	102.3	+
2006-4	Chert	71.1	62.6	33.1	150.5	-
2008-1	Chert	60.0	43.8	25.8	64.3	+
*4006-34	Chert	17.9	15.5	14.6	4.1	-
*4006-35	Chert	17.3	14.3	14.6	3.3	-

* Same artifact - broken

Medium Bifaces

Medium bifaces (Table 5) are artifacts made by percussion technique on smaller, thinner, and flatter flake blanks than are the items described above, but exhibit a similar range of raw material quality. Most are small fragments of Stage One bifaces; two specimens (4006-2, Figure 9a; 9002, Figure 9b) are intact, rejected because of flaws and poor morphology. Three artifacts (4006-17, 4006-18, 4006-19) are Stage Two biface fragments where flake scars cross the midline and thinning has occurred. Mean TTW ratio for all medium bifaces is .41; less than the mean TTW ratio for large bifaces and in the TTW range of bifaces from the Lake Range and Tosawihi quarries. However, the South Pulpit Shelter medium bifaces are much smaller overall and were made on thinner flake blanks to begin with. Mean TTW ratio for only Stage I medium bifaces is .43, while the mean TTW ratio for the three Stage II bifaces is .28. This difference reflects the amount of thinning accomplished between Stage I and Stage II.

Table 5. Attributes of Medium Bifaces.

Specimen No.	Material	Millimeters Length	Width	Thickness	gms Weight	Complete
1005-3	Chert	43.8	29.2	7.0	11.8	-
1007-5	Chert	32.5	35.8	9.4	9.3	-
1009-1	Chert	30.7	23.3	11.5	5.7	-
1010-1	Chert	41.1	11.4	5.9	2.7	-
2005-4	Chert	22.9	11.5	8.1	1.9	-
2005-5	Chert	30.8	13.3	8.0	2.8	-
2005-6	Chert	48.3	20.7	13.6	11.4	-
2005-7	Chert	54.6	40.6	16.5	29.9	+
2005-9	Chert	19.8	28.9	13.1	7.1	-
2005-12	Chert	17.7	25.4	10.1	5.2	-
2009-2	Chert	16.9	28.3	11.4	5.1	-
4006-2	Chert	77.4	44.2	12.9	45.1	+
4006-7	Chert	35.3	28.4	7.3	7.3	-
4006-8	Chert	38.4	44.4-	16.2	33.6	-
4006-10	Chert	17.3	21.7	8.0	2.6	-
4006-12	Chert	32.8	24.0	8.6	7.4	-
4006-16	Chert	46.0	32.5	9.2	11.5	-
4006-17	Chert	33.0	26.4	8.4	7.6	-
4006-18	Chert	43.5	47.7	10.2	23.8	-
4006-19	Chert	25.0	30.5	7.2	4.9	-
4006-27	Chert	48.9	21.3	8.5	10.6	-
9002	Chert	80.2	41.8	15.2	48.3	+

Small Bifaces

These artifacts are made on yet smaller flake blanks; several may have been reduced using only pressure technique. All chert specimens have been heat treated. Most of these artifacts are represented by small fragments (Table 6), so terminal morphology is not certain, although a leaf-shaped form with a wide base is suggested. Specimens 1004-2, 1006-2, 1008-1, 2007-4, 4005-1, 4006-10, 4006-13, 4007-1, 4007-20, 4008-1 are all Stage One bifaces without fully reduced flake blank surfaces. Specimens 1007-4, 2006-8, 2006-12, 4006-14 and 4007-8 are Stage Two bifaces. Specimens 4007-14 and 4008-1 are notable, both made of obsidian rather than chert. Mean TTW ratio for small Stage I bifaces is .24, and .23 for Stage II bifaces. The small difference between the two stages reflects the small size and thinness of the initial flakes: relatively little thinning was required.

Table 6. Attributes of Small Bifaces.

Specimen No.	Material	Millimeters Length	Width	Thickness	gms Weight	Complete
1004-2	Chert	15.0	20.1	5.6	1.6	-
1006-2	Chert	26.7	29.2	4.3	3.5	-
1007-4	Chert	25.0	38.2	7.3	8.2	-
1008-1	Chert	20.4	25.5	3.7	2.2	-
2006-12	Chert	20.2	26.3	5.4	4.2	-
2007-4	Chert	9.1	8.2	2.8	0.2	-
4005-1	Chert	28.3	29.5	5.4	5.8	-
4006-10	Chert	11.8	17.5	3.4	0.7	-
4006-13	Chert	27.6	22.4	4.8	2.9	-
4006-14	Chert	41.1	26.5	5.3	6.1	-
4007-1	Obsidian	15.5	21.3	5.1	1.8	-
4007-8	Chert	15.9	18.0	5.5	1.4	-
4007-20	Chert	13.3	10.7-	4.2	0.5	-
4008-1	Obsidian	14.5	16.0	4.8	1.0	-

Triangular Bifaces

These are small, pressure-reduced, triangular bifaces with convex bases. Specimens 4007-9 (Figure 10d) and 2006-9 (Figure 10e) are chert; specimens 1004-1 (Figure 10f) and 1007-2 (Figure 10g) are obsidian (Table 7). Both chert specimens are heat treated. Specimen 4007-9 is a Stage One biface with an incompletely reduced dorsal surface. The other artifacts are fully reduced, although their edge morphology is irregular. These items may be preforms for projectile points; their size and shape suggest Rosegate points as the most likely possibility. The mean TTW ratio for these artifacts is .17, the same as the mean TTW ratio for projectile points from the shelter.

Miscellaneous Bifacial Artifacts

Specimen 2006-2 (Table 7, Figure 12a) is a pressure flaked, secondary obsidian flake with a small patch of cortex remaining on one edge. It is vaguely notched or waisted, and may be a projectile point preform. Specimen 2006-10 is a chert biface thinning flake with two pressure flakes removed from the ventral surface.

Table 7. Attributes of Triangular Bifaces and Miscellaneous* Bifacial Artifacts.

Specimen No.	Material	Millimeters Length	Width	Thickness	gms Weight	Complete
1004-1	Obsidian	31.5	24.6	3.9	2.3	+
1007-2	Obsidian	14.2	23.9	4.0	1.5	-
2006-9	Chert	19.2	26.0	3.3	1.8	-
4007-9	Chert	26.1	29.7	6.0	5.2	-
*2006-2	Obsidian	35.3	21.1	5.3	4.5	-
*2006-10	Chert	25.9	20.0	4.1	2.5	-

Thin Bifaces

Three artifacts (Table 8) exhibit technological variation seemingly different from the assemblage described above. All three artifacts are fragments of wide, very thin bifaces. All three exhibit edge grinding and longitudinal basal thinning. The relative thinness of these artifacts is much greater (TTW ratios between .08 and .13) than that of all other bifacial tools in the collection except for the Desert Side-notched projectile point described later. It is possible the edge grinding represents platform preparation, rather than haft protection; even so, edge grinding is absent elsewhere in the collection except on a stemmed point (specimen 4006-9) described later.

Two specimens (1002-2, 2006-8) are fragments of the same late Stage II biface of translucent, cream colored chert (Figure 10a, b). These fragments were found in adjacent excavation units, but separated vertically by 40 cm. Edge grinding appears on only a small portion of the base of specimen 2006-8 (Figure 10b); a corner of the biface was removed accidentally while the edge was being thinned. The outside margin of the fragment is also a truncation documenting an earlier break. Both fragments were modified (reworked) subsequent to the break.

Specimen 2006-17 (Figure 10c) is a fragment of an obsidian Stage III biface with a slightly concave base truncated by a bending break. Edge grinding is present on the base at either side of the major longitudinal thinning scar and along portions of one lateral edge.

Specimen 4007-6 is the basal portion of a large, very thin chert biface (Figure 11a). The edges are straight, and the base is slightly concave. One face exhibits a single longitudinal thinning scar originating at the base, but mostly obscured by subsequent lateral thinning scars. Lateral scars on both faces tend toward collaterality. Edge grinding is present on the base and along one margin. Aside from the one obsidian specimen, the raw materials (local chert) used in the manufacture of thin bifaces is similar to that observed among other tools and debitage from the shelter, but the reduction technique employed on these thin bifaces seems to have allowed much better control of the flaking process. In technique and execution, these tools closely resemble a stemmed point (specimen 4006-9) from the shelter, and other artifacts typical of the early Holocene Pre-Archaic in the Black Rock Desert, as described by Clewlow (1968). If these are Pre-Archaic artifacts, they may have been scavenged and brought to the shelter by its Archaic occupants.

Table 8. Attributes of Thin Bifaces.

Specimen No.	Material	Millimeters Length	Width	Thickness	gms Weight	Complete
*1002-2	Chert	28.3	42.6	5.1	7.6	-
*2006-8	Chert	18.3	19.1	3.8	0.9	-
2006-17	Obsidian	25.4	40.7	4.0	3.7	-
4007-6	Chert	53.5	50.3	6.7	18.5	-

* Same artifact - broken

Flake Tools

For the most part, these are edge-damaged flakes which appear to have been utilized and/or modified slightly to accommodate scraping and cutting tasks; of course, some edge damage could have resulted from trampling by shelter occupants. Some tools are made on large, thick flakes or flake fragments (Figure 9c), but most are made on secondary flakes (Figure 12b, e-f) and biface thinning flakes (Figure 12d). One artifact (4006-39) is a small flake fragment with a graver point created by unifacial flaking (Figure 12c). The tip of the graver is crushed and worn. Attributes of flake tools are presented below in Table 9.

Table 9. Attributes of Flake Tools.

Specimen No.	Type	Material	Millimeters Length	Width	Thickness	gms Weight
1005-6	M/U	Chert	100.1	32.5	22.0	61.6
1005-11	U	Chert	35.6	27.3	4.0	3.9
1006-1	M/U	Chert	81.3	33.1	11.1	34.8
1006-4	M/U	Chert	39.4	21.3	5.9	5.2
1006-5	U	Chert	29.1	23.6	5.8	3.9
1007-3	U	Chert	56.7	31.1	8.5	15.7
1008-2	M/U	Chert	28.6	40.3	10.0	8.8
2000-1	M/U	Chert	19.0	40.6	4.4	3.8
2006-3	M/U	Chert	30.9	23.3	7.8	6.7
2006-7	U	Chert	39.4	59.5	20.3	48.6
2009-1	U	Chert	28.2	21.0	4.1	2.5
4004-8	U	Chert	29.0	31.1	3.4	2.9
4005F-1	U	Chert	41.9	62.9	17.3	36.1
4006-6	U	Chert	55.0	27.3	5.9	8.8
4006-11	U	Chert	29.7	48.0	12.5	12.9
4006-26	M/U	Chert	53.3	31.3	5.7	8.7
4006-28	U	Chert	54.5	30.2	6.4	11.7
4006-36	U	Chert	48.3	29.5	7.9	13.1
4006-37	M/U	Chert	21.5	24.6	2.7	1.7
4006-39	M/U	Chert	11.3	10.2	2.1	0.3
4006-41	M/U	Chert	39.9	52.5	28.4	46.8
4007-2	M/U	Chert	21.3	26.6	5.4	3.6
4007-3	U	Chert	70.7	39.8	14.2	49.3
4007-4	U	Chert	51.2	48.0	5.9	12.5
4007-5	U	Chert	27.2	13.8	3.3	1.4
4007-21	U	Chert	20.1	12.2	4.5	1.0
4007-22	U	Chert	10.3	18.0	2.9	0.5
4010-1	M/U	Chert	9.6	22.2	4.5	0.9

U = Utilized M/U = Modified and utilized

Flaked Fragments

Five specimens (1005-2, 2005-8, 2005-10, 2006-5, 4006-40) are angular artifact fragments, probably of large bifaces like those previously described. All have crazing and /or crenated fracture surfaces typical of thermal stress.

Seven specimens (1005-1, 2006-6, 4001-2, 4004-9, 4006-5, 4006-38, 4007-23) are fragments of thick flakes that have been produced through bipolar technique. Specimens 1005-1, 2006-6,

4006-5, and 4007-23 were produced by striking the flat side of the flake. Specimens 4001-2, 4004-9, and 4006-38 are the result of striking the edge of the flake.

Specimen 2004-2 is large flake of hydrated, opaque gray opalitic material. It has a triangular cross section; a flake has been struck from the dorsal surface on each side. Specimen 2002-1 is a flake of material similar to 2004-2, but is much smaller, and has a single flake scar on the ventral surface. Specimen 4006-15 is a technologically undiagnostic, angular fragment of grainy, opaque gray chert produced from thermal stress. Specimen 1006-3 is a potlid of red chert which has been flaked on one margin. All flaked fragments are made of locally available chert (Table 10).

Table 10. Attributes of Flaked Fragments.

Specimen		Millimeters			gms
No.	Material	Length	Width	Thickness	Weight
1005-1	Chert	34.0	20.0	9.4	5.1
1005-2	Chert	54.7	27.5	22.3	38.5
1006-3	Chert	32.0	29.4	9.5	8.1
2002-1	Chert	50-8	30.6	7.6	10.9
2004-2	Chert	85.8	49.7	24.4	128.1
2005-8	Chert	52.0	28.2	28.9	56.6
2005-10	Chert	25.9	25.7	15.5	10.0
2006-5	Chert	41.6	21.1	20.0	20.6
2006-6	Chert	41.3	32.0	19.0	17.0
4001-2	Chert	23.5	35.8	11.6	10.0
4004-9	Chert	39.3	29.6	14.1	15.7
4006-5	Chert	39.2	35.0	16.9	25.1
4006-15	Chert	66.8	36.8	33.1	68.9
4006-38	Chert	37.7	16.8	13.6	8.3
4006-40	Chert	36.0	24.1	17.2	19.6
4007-23	Chert	13.0	13.0	11.6	2.7

Figure 8. Tabular chopper (a) and large bifaces (b-d).

a) specimen 4006-1
b) specimen 1005-7
c) specimen 1005-9
d) specimen 2006-1

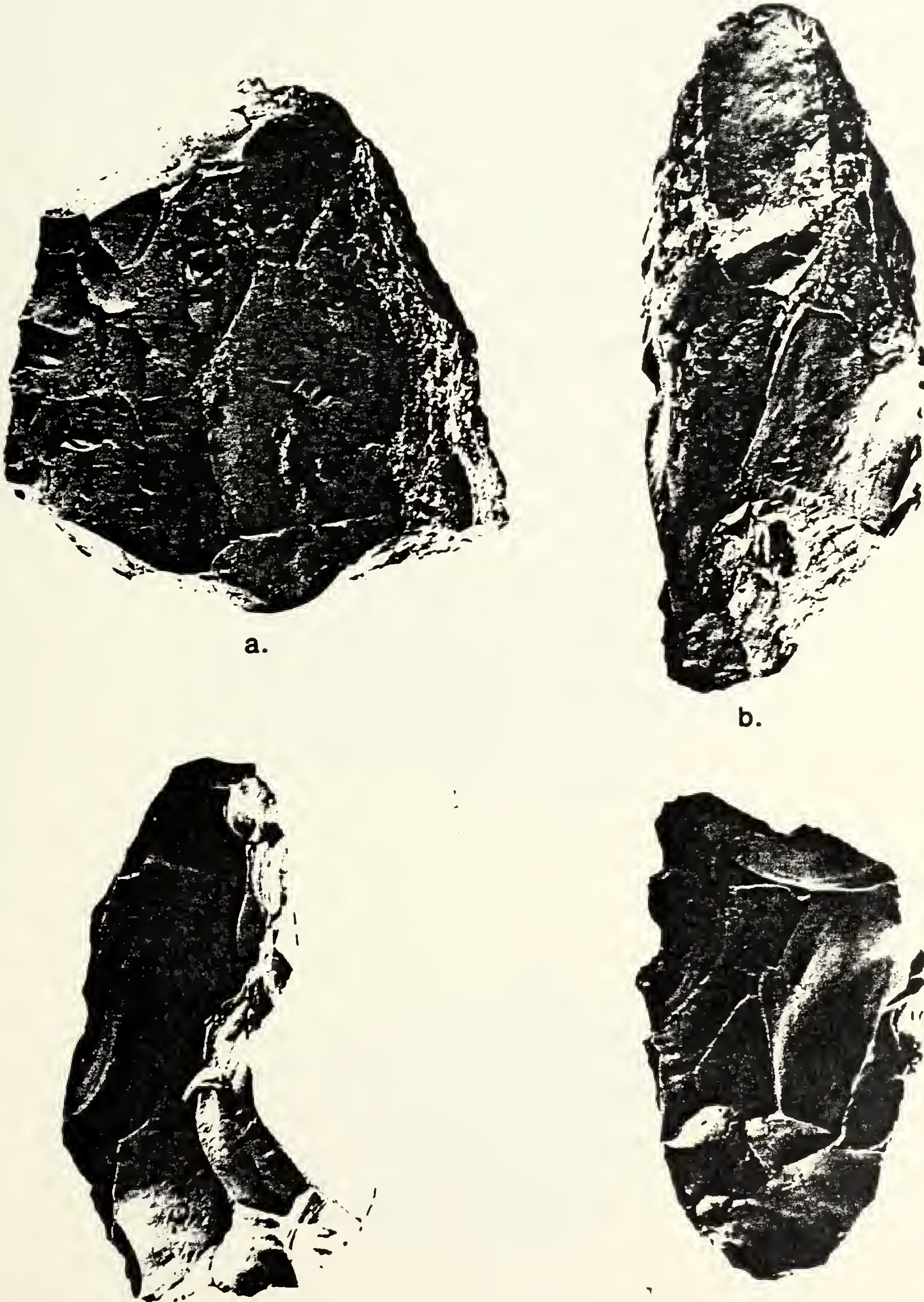

a.
b.
c.
d.
0 CM 3

Figure 9. Medium bifaces (a-b) and flake tools (c).

a) 4006-2
b) 9002
c) 4006-41


a.
b.
c.
0 cm 3

Figure 10. Thin bifaces (a-c) and triangular bifaces (d-g). Dots enclose edge grinding.

a) specimen 1002-2
b) specimen 2006-8
c) specimen 2006-17
d) specimen 4007-9
e) specimen 2006-9
f) specimen 1004-1
g) specimen 1007-2

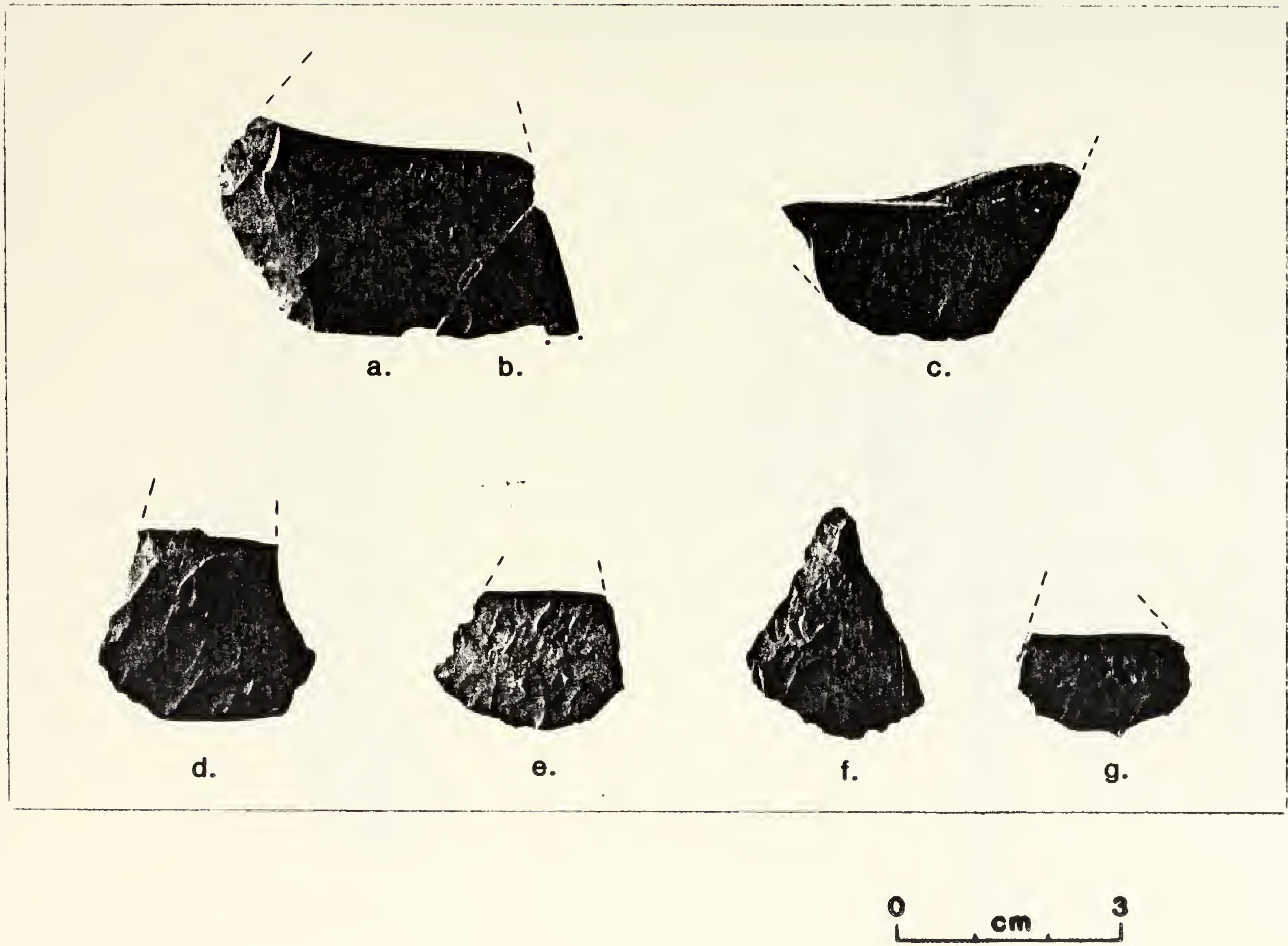

a.
b.
c.
d.
e.
f.
g.
0 cm 3

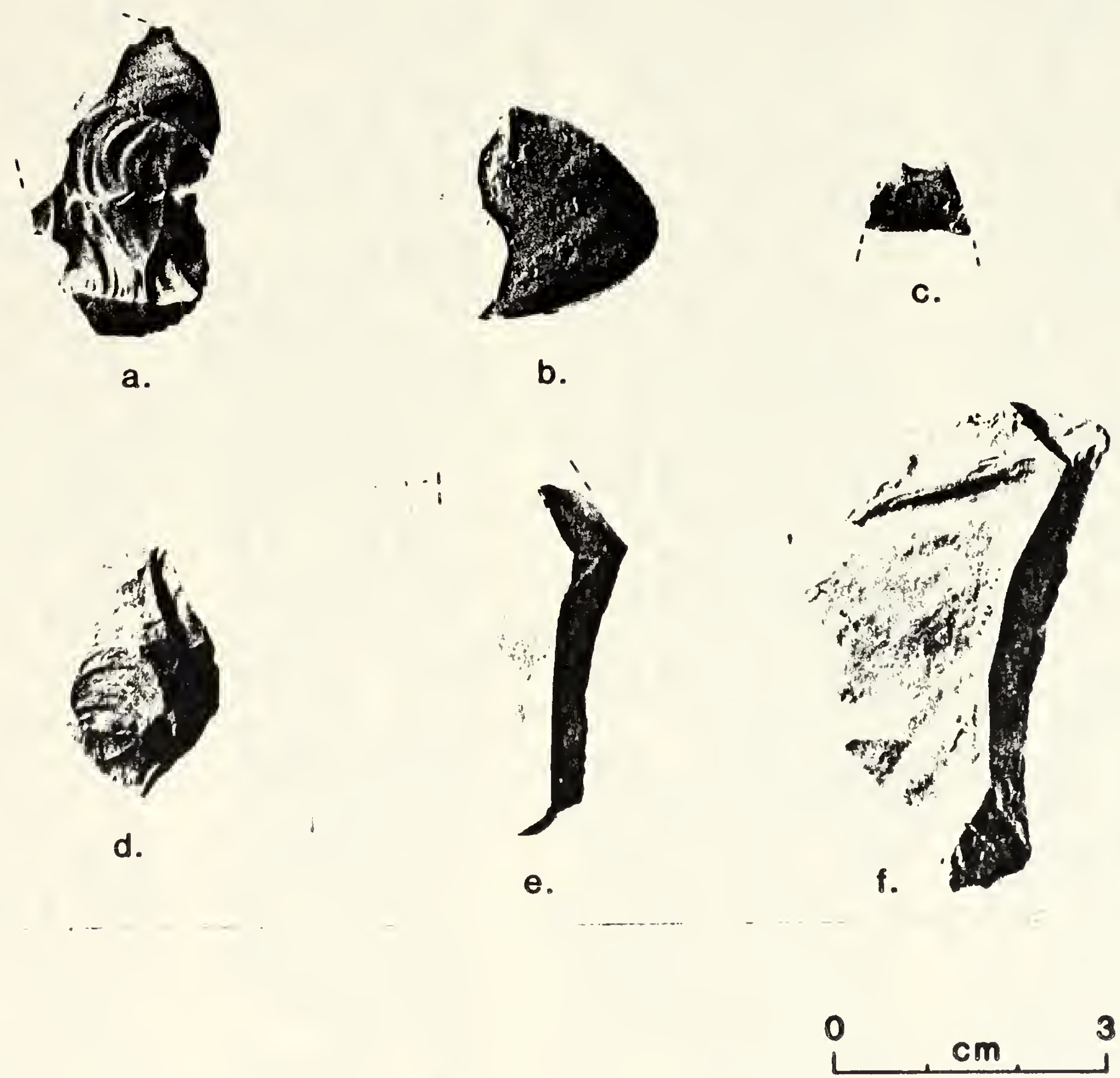
Figure 11. Thin biface (a) and stemmed point (b). Dots enclose edge grinding.

a) specimen 4007-6
b) specimen 4006-9


a.
b.
0
cm
3

Figure 12. Bifacial artifact (a), flake tools (b, d-f), and graver tip (c).

a) specimen 2006-2
b) specimen 4006-37
c) specimen 4006-39
d) specimen 2009-1
e) specimen 1006-4
f) specimen 4006-6


a.
b.
c.
d.
e.
f.
0
cm
3

Projectile Points

Eight artifacts were identified as projectile points or projectile point fragments. While all items are fragmentary to one degree or another, five retain sufficient morphology to allow classification to type (Table 11).

Specimen 4004-1 is classified as a Desert Side-notched point (Figure 13a). Manufactured from translucent green obsidian, it was thinned completely on both dorsal and ventral surfaces. One margin is slightly more sinuous than the other, and appears to have been resharpened. The point is broken along a diagonal between side and basal notches. Desert Series points date from A.D. 1300 to historic contact (Thomas 1981).

Two artifacts are classified as Rosegate points. Specimen 4007-19 was made on a chalcedony flake with both dorsal and ventral surfaces reduced (Figure 13b). The tip and one margin of this artifact are missing, probably broken as a result of impact or notching failure. Specimen 2005-3 (Figure 13c) also was manufactured on a chalcedony flake. Its dorsal surface has been thinned and reduced, but only lateral margins on the ventral surface have been modified. The shoulders on this point are notched broadly and one lateral margin is missing. The notches on this artifact may have been reworked. Rosegate series points date from A.D. 700 to A.D. 1300 (Thomas 1981).

The fourth typable point in the collection is classified as Elko Eared (Figure 13e). It was made from black obsidian and, while reduced on both dorsal and ventral surfaces, it remains rather chunky in cross section. The point is missing portions of both ears and burin-like impact fractures truncate the tip and one lateral margin. Step fractures along the remaining margin suggest the point may have been used for scraping. Elko series points have been dated between 1300 B.C. and A.D. 700 (Thomas 1981).

Finally, specimen 4006-9 is the basal fragment of a stemmed projectile point representative of the Great Basin Stemmed Point Series (Tuohy and Layton 1977), most likely a Haskett Point. The artifact is 69.4 mm long, 30.2 mm wide, and 5.4 mm thick, (TTW ratio .18) and has a diagonal break across the blade beginning just above one shoulder (Figure 11b). Below the slight shoulders, the point has a long, tapering stem. Both faces exhibit collateral flaking, with some flake scars crossing from one edge to the other. The stem edges and one shoulder are ground smooth, although portions of the

Table 11. Projectile Point Attributes.

Spec. No.	Type	Material	L	W	Th	Lt	La	Lm	Wm	Wb	Nw	Wt	Est. Wt.	DSA	PSA	NOI	BIR	L/W	Wb/Wm	Lm/Lt
4004-4	DSN	Obs	27.3	16.1	2.0	27.3	22.3	-	(16.1)	(16.1)	6.9	.5	.6	194	178	16	.82	1.7	1.00	-
4007-19	RSG	Chal	15.3	16.2	3.3	(31.7)	(31.7)	-	(21.1)	9.5	8.6	.8	1.5	113	108	5	1.00	1.5	.45	-
2005-3	RSG	Chal	24.4	11.7	2.8	(28.4)	(28.4)	6.1	12.9	7.5	6.4	1.0	1.1	219	115	104	1.00	2.2	.58	.21
4006-3	EAR	Obs	25.1	23.1	4.6	(34.8)	(31.2)	-	(25.7)	(19.2)	14.6	2.6	3.0	159	130	29	.89	1.4	.74	-
4006-9	GBS	Chert	69.4	30.2	5.4	(117.0)	(117.0)	64.3	(38.0)	(16.0)	25.2	10.3	20.0	251	96	155	0.00	1.8	.42	.55

F R A G M E N T

Spec. No.	Type	Material	L	W	Th	Wt.
1007-1	Base	Obs	10.4	20.2	3.5	.7
4006-4	Tip	Chert	23.5	15.4	2.8	1.0
1002-1	M. Section	Obs	7.4	17.3	4.1	.6

Measurements are in millimeters and grams; numbers in parentheses are estimated dimensions.

Key:

Spec. No. - Specimen No.

<u>Type</u>
DSN - Desert Side-notched
RSG - Rosegate Series
EAR - Elko Eared
GBS - Great Basin Stemmed

<u>Material</u>
Obs - Obsidian
Chal - Chalcedony

L - Length
W - Width
Th - Thickness
Lt - Total Length
La - Length of Longitudinal Axis
Lm - Length from Proximal End of Point to the Maximum Width
Wm - Maximum Width
Wb - Basal Width
Nw - Neck Width
Wt - Weight in grams

DSA - Distal Shoulder Angle, between 90 - 270
PSA - Proximal Shoulder Angle, between 0 - 270
NOI - Notch Opening Index
BIR - Basal Indentation Ratio, L/W, Wb/Wm, Lm/Lt

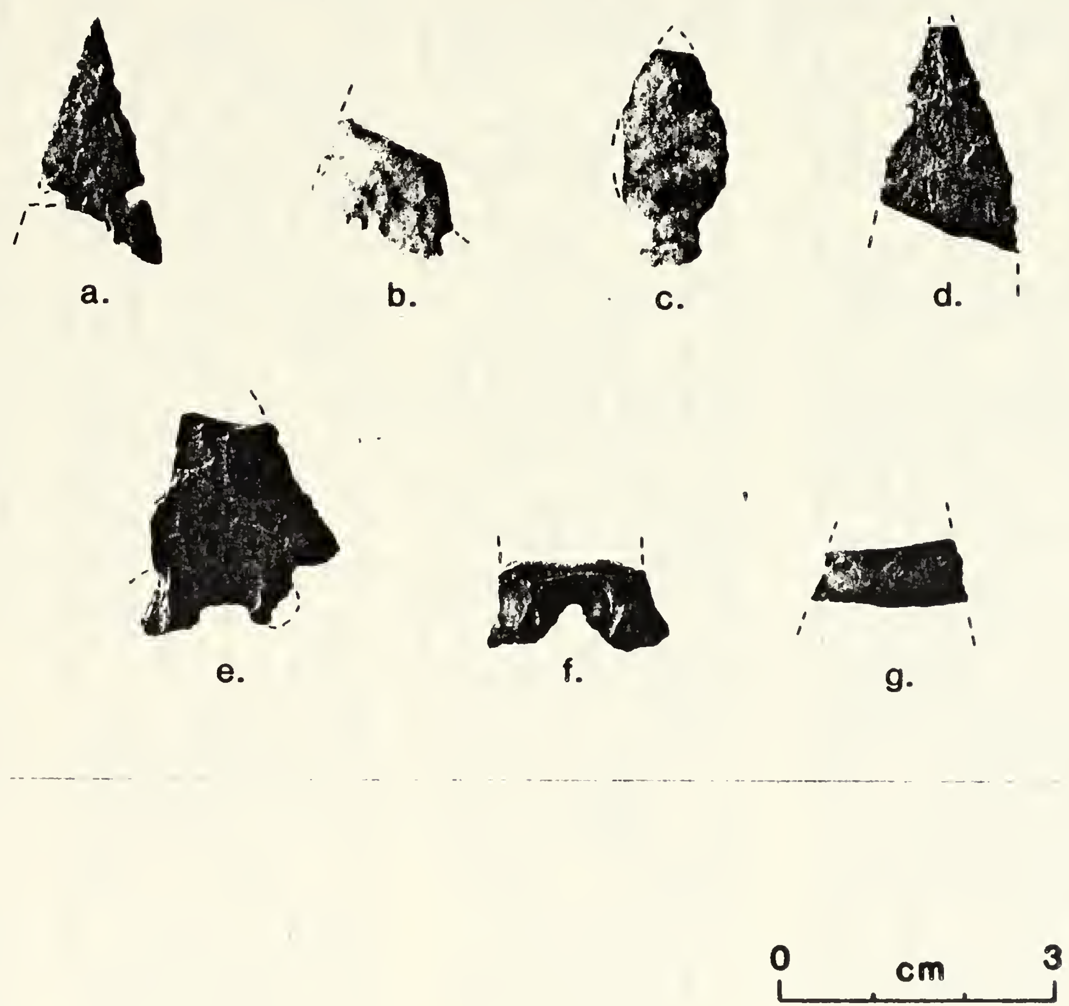
ground edge have been removed by flake detachment subsequent to edge grinding. Like specimen 4007-6, this Pre-Archaic artifact probably was scavenged by later Archaic people.

The three untypable projectile point fragments consist of a base (Specimen 1007-1, Figure 13f), a tip (Specimen 4006-4, Figure 13d), and a midsection (Specimen 1002-1, Figure 13g). The base may represent the ears of an Elko Eared point, but the deep basal notch suggests it could also be a Humboldt Basal Notched point. It was made from black obsidian and is hinge fractured, suggesting that it broke during impact with the ground or an animal.

The point tip is classified on the basis of extensive thinning and careful flaking. Its thin, lenticular cross section suggests that it could be assigned to the Rosegate series. Finally, the point midsection exhibits similar thinning, but its cross section is thick, resembling those of Elko series points. This artifact is made of translucent black obsidian.

Figure 13. Illustration of projectile points and point fragments.

a) Desert Side-notched; specimen 4004-4
b) Rosegate; specimen 4007-19
c) Rosegate; specimen 2005-2
d) Tip; specimen 4006-4
e) Elko Eared; specimen 4006-3
f) Notched base; specimen 1007-1
g) Midsection; specimen 1002-1


a.
b.
c.
d.
e.
f.
g.
0 cm 3

Debitage

Two thousand nine hundred seventy-five debitage items were recovered from South Pulpit Shelter. Similar to the flaked stone tool assemblage, debitage material types are dominated by local chert (N=2956), while obsidian constitutes less than one percent of the collection (N=19).

Approximately fifty percent of the recovered debitage (N=1530) was analyzed in detail; the sample was drawn from excavation Unit 4. Of these, 962 (63%) were identified to flake type, while the remainder are represented by type unidentifiable fragments. Even excluding potlids and shatter, it is noteworthy that over half the analyzed debitage (N=816, 53%) are complete or nearly complete flakes. We suspect the majority of the flake fragments represent broken biface thinning flakes, which commonly are more thin and delicate than primary and secondary flakes, and thus more susceptible to breakage.

Table 12 presents flake frequencies by class/type and level in Unit 4. Secondary flakes dominate, followed by biface thinning flakes. Ten percent of the assemblage are potlids and shatter, representative of both thermal alteration and angular waste generated by primary and/or secondary reduction. All the obsidian debitage (N=7) are secondary reduction flakes. Primary reduction flakes are extremely rare at the site, a scarcity that can be attributed to two factors: the nature of the locally available toolstone and the displacement of initial reduction (decortication).

Regarding the first case, cortex is developed only poorly on the local cherty rocks where the majority of lithic raw material occurs as angular (often tabular) pieces weathering out of large outcrops. Moreover, it is likely that primary flaws will be relatively uncommon at a workshop site such as South Pulpit Shelter where extracted and minimally processed lithic raw material was transported for further reduction (Elston 1986a). Primary and secondary reduction debitage dominate assemblages at workshop sites, indicating initial processing of lithic resources occurred near their source.

Use of 1/4 inch mesh to screen Unit 4 deposits precluded the recovery of tertiary flakes (i.e., small, thin flakes produced during the final stage of tool production or tool rejuvenation). Any larger specimens of tertiary flakes probably were classified as biface thinning flakes. Although there is evidence of tool finishing and maintenance among the tools recovered from the shelter, we have no direct evidence of this activity in the debitage.

Table 12. Debitage Class by Level in Unit 4.

(All weights are in grams.)

Level	Potlids/ Shatter			Primary			Secondary			Biface Thinning			Fragments					
	N	%	Wt.	N	%	Wt.	N	%	Wt.	N	%	Wt.	N	%	Wt.	Total	%	Wt.
1	-	-	-	-	-	-	4	.50	21.1	2	.25	0.6	2	.25	3.0	8	100	24.7
2	-	-	-	-	-	-	5	.71	1.9	-	-	-	2	.29	1.0	7	100	2.9
3	2	.13	5.6	-	-	-	5	.33	13.9	3	.20	5.1	5	.33	5.6	15	100	30.2
4	3	.07	40.2	-	-	-	22	.52	117.6	8	.19	2.3	9	.21	4.2	42	100	164.3
5	29	.15	154.4	-	-	-	55	.29	85.6	43	.23	56.6	64	.34	27.0	191	100	323.6
6	51	.09	128.7	-	-	-	184(2)	.31	453.9	109	.18	108.0	249	.42	135.7	593	100	826.3
7	50	.09	120.0	-	-	-	172	.31	597.1	118	.22	86.0	208	.38	158.6	548	100	961.7
8	7	.13	27.8	-	-	-	23	.42	33.5	12	.22	5.7	13	.24	5.2	55	100	72.2
9	4	.08	1.7	-	-	-	27(1)	.52	45.0	8	.15	3.1	13	.25	22.7	52	100	72.5
10	-	-	-	1	.07	9.2	6(2)	.43	8.9	4	.29	1.1	3	.21	1.2	14	100	20.4
11	-	-	-	-	-	-	3(2)	1.00	2.5	-	-	-	-	-	-	3	100	2.5
12	-	-	-	-	-	-	-	-	-	1	1.00	0.1	-	-	-	1	100	0.1
13	-	-	-	-	-	-	1	1.00	5.9	-	-	-	-	-	-	1	100	5.9
Total	146	.10	478.4	1	.001	9.2	507	.33	1386.9	308	.20	268.6	568	.37	364.2	1530	100	2507.3

( ) = Number of total that are obsidian.

Biface Manufacture

The manufacture of bifaces from local chert was a major activity at South Pulpit Shelter. Representing all stages in the reduction continuum, bifaces constitute over half (52%) the flaked tool assemblage, and are found throughout the shelter deposits. Bifaces manufactured on locally available chert dominate (90%), particularly initial stages of reduction (98%).

If one were to recover and classify every flake generated by the production of a bifacial tool (raw material to finished tool), the cumulative frequency curve would be more or less S-shaped, as in Figure 14. The closer the site to a lithic source, the straighter the curve is expected to be in the region of early stage debitage, while curves for assemblages relatively distant from lithic sources will be more concave in the region of early stage reduction (Zeier and Elston 1987). Based on these models, the debitage curve for chert flake types at South Pulpit Shelter (see Figure 14) appears most like the ideal curve for a near-source assemblage, with the exception of the flat region given by the low amounts of identified primary flakes. As discussed above, this is due to decortication at the source, and/or an inability to recognize primary flakes due to poorly developed cortex on the local toolstone.

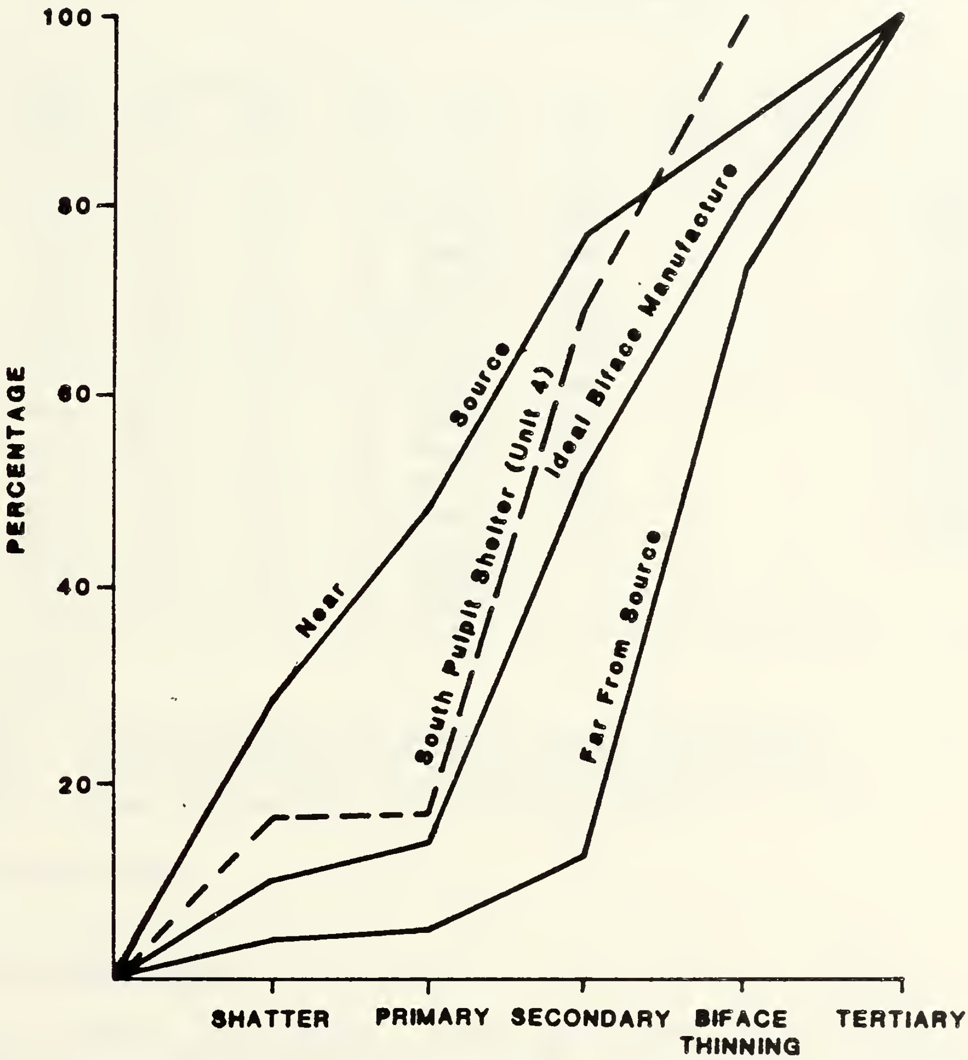
Groundstone

Twelve groundstone fragments were recovered during testing at South Pulpit Shelter (Table 13). Quartzite (42%/n=5) and basalt (42%/n=5) dominate; one is tuff and one is a calcium carbonate conglomerate. Nearly all the groundstone has been affected by fire.

Analysis shows that most of the fragments represent manos, but one (4006-22) appears to be a tabular metate fragment that exhibits heavy, unifacial wear and evidence of resharpening (pecking). Of the manos, most appear to moderately worn in a unifacial pattern. Three items (4006-21, 4006-23, 4006-24) may be fragments of the same mano; while none fit together, all exhibit a similar curvature and lithic materials are identical. Similarly, specimens 1006-6 and 4007-11 may represent the same artifact.

Specimen 4001-1 is interesting in that it is made on a small tabular piece of calcium carbonate conglomerate. The ground surface on this artifact is roughly 15 mm in diameter and exhibits moderate wear with several deeply grooved, parallel stria. It may have been used as a polishing stone.

Figure 14. Ideal debitage curves and debitage stage profile at South Pulpit Shelter (after Zeier and Elston 1987; adapted from Thomas 1983a:419-422).



100
80
60
40
20
PERCENTAGE
Near
Source
South Pulpit Shelter (Unit 4)
Ideal Biface Manufacture
Far From Source
SHATTER
PRIMARY
SECONDARY
BIFACE THINNING
TERTIARY

Groundstone in South Pulpit Shelter deposits suggests that seed processing occurred at the site. The fragmentary nature of the groundstone assemblage and high incidence of fire-alteration indicate that expended items were recycled as hearth rocks.

Table 13. Provenience and Attributes of Groundstone Artifacts and Fire-Affected Rock.

Spec. No.	Length (mm)	Width (mm)	Thickness (mm)	Weight (gm)	Material	Type	Complete	Fire-Affected	Type of Wear
1005-10	50.7	16.1	25.0	20.9	Basalt	Mano?	-	+	Unifacial/Light
1006-6	44.7	22.8	15.8	22.9	Quartzite	Mano	-	+	Unifacial/Moderate
2001-1	39.0	51.6	27.8	72.2	Quartzite	Mano	-	+	Unifacial/Heavy
2006-11	42.8	16.7	31.4	25.0	Quartzite	Mano?	-	-	Unifacial/Moderate
2010-1	83.0	18.6	37.7	56.5	Tuff	Mano	-	+	Unifacial/Moderate
4006-20	44.2	14.9	38.9	24.3	Basalt	Mano	-	+	Bifacial/Moderate
4006-21	49.2	45.9	29.2	66.3	Basalt	Mano	-	+	Bifacial/Moderate
4006-22	58.7	36.3	35.1	54.6	Quartzite	Metate	-	+	Unifacial/Heavy
4006-23	31.9	24.8	20.0	19.7	Basalt	Mano	-	+	Bifacial/Moderate
4006-24	44.9	22.1	20.8	22.9	Basalt	Mano?	-	+	Bifacial/Light
4007-11	25.0	26.9	12.5	10.2	Quartzite	Mano	-	+	Unifacial/Moderate
4001-1	40.6	38.4	8.2	18.2	Carbonate	?	-	-	Unifacial/Moderate
2005-13*	79.1	87.3	35.8	274.5	Quartzite	-	-	+	-
4006-25*	51.4	43.7	15.8	34.7	Basalt	-	-	+	-

Key: Type of Wear

Light - faint polish present on approximately one-half of surface area.
Moderate - ground facet developed, polish present over entire grinding surface.
Heavy - slight trough developed, pecked to resharpen surface.

* Fire-affected rock

Fire Affected Rock

Two items collected from South Pulpit Shelter are classified as fire-affected rock (Table 13). These are culturally unmodified rocks or manuports that have been altered by intense heat, probably of campfires. Both are angular, with characteristic random heat spalls on cortical surfaces. Neither specimen exhibits evidence of use as grinding implements or tool production.

Perishable Artifacts

Arrow Fragment

The proximal section of a *Phragmites* sp. arrow mainshaft was recovered from level 4 of Unit 4. The specimen contains a nocked wooden plug inserted into the proximal end of the mainshaft (Figure 15), probably to prevent crushing the reed when the bow was drawn (see Janetski 1980:80). Resin used to cement the wooden plug into the mainshaft is evident. Impressions of sinew binding used to fletch the arrow and/or hold the nocked insert in place is evident in pronounced striations around the shaft circumference, extending from the nocked end to 25.2 mm down the shaft. Use-wear striations appear between the lobes of the nock. The specimen is 73.7 mm in length and the shaft diameter varies between 8.9 mm and 7.1 mm.

Similar artifacts have been recovered from dry caves and rockshelters throughout the Great Basin (e.g., Dalley 1970; Janetski 1980; Juell 1987; Loud and Harrington 1929; Pendleton 1985).

Knotted Sagebrush

Specimen 4004-3 is a twisted (right lay) strip of big sagebrush (*Artemisia tridentata*) bark tied in a knot (Figure 16). Because the fiber is shredded and extremely fragile, handling of the artifact during analysis was limited. Tentatively, the knot appears to be the result of two overhand knots tied on a single strand, perhaps to form a loop. The artifact is approximately 52 cm long and the knot diameter is 2.7 cm.

The artifact probably is a fragment of a larger cordage item used for binding, lashing, and/or matting. Sagebrush bark is a readily available source of fiber and apparently was used for expedient tasks such as lashing for temporary brush shelters (Elston and Budy 1987). Culturally modified plant fiber is common in Great Basin caves and rockshelters (e.g., Adovasio and Andrews 1983; Aikens 1970; Goodman 1985; Loud and Harrington 1929). Basin Research Associates (1986) report artifacts similar to the specimen described here from John Dryden Cave in the Smoke Creek Desert.

Figure 15. Arrow fragment, specimen 4004-1.

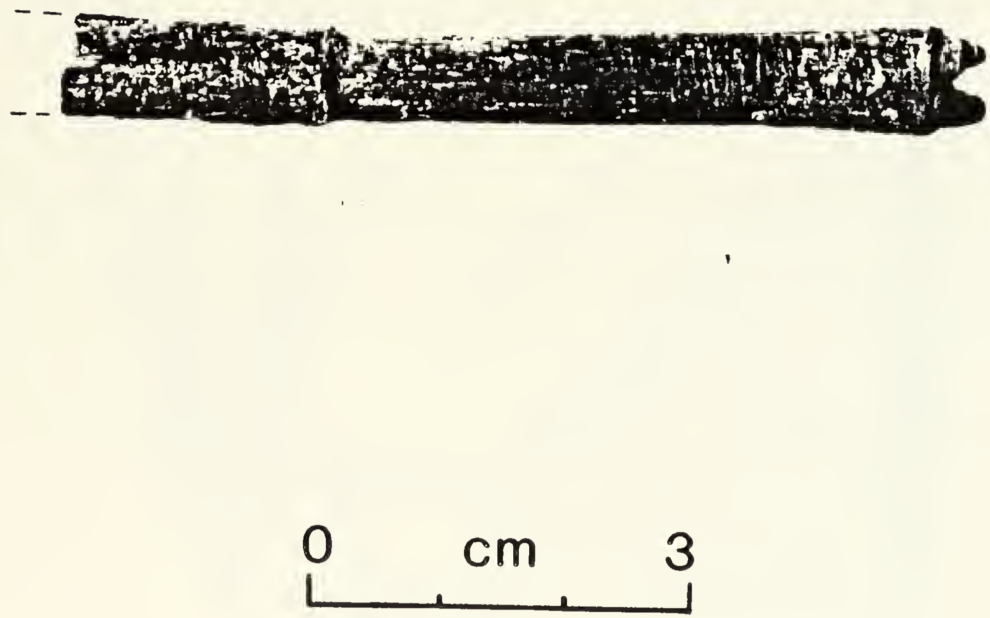

0
cm
3

Figure 16. Knotted sagebrush, specimen 4004-3.


0 CM 3

Shell Bead

Specimen 4004-2 is a Dentalium shell bead that can be classified as Type B2 (Gifford 1947:7). It is fragmentary, measuring 9.0 mm in length with a 3.7 mm diameter. One end is polished extensively, and the stringing material has worn a shallow groove along a portion of its periphery. A shallow incised line encircles three-quarters of the bead just below its broken end.

Ethnographic evidence shows that shell beads were imported to the Great Basin for use as ornamentation and as a medium of exchange (Bennyhoff and Heizer 1958). The traditional source of Dentalium beads is Vancouver Island, but the species habitat extends as far south as Santa Barbara (Bennyhoff and Heizer 1958:67). Dentalium beads have been recovered from a number of sites in the western Great Basin, including the Derby site (Tuohy 1970), Rye Patch Reservoir sites (Rusco and Davis 1987), Parran Lakebed, Pelican Island, Thea Heye Cave, and five other sites in Churchill or Pershing Counties (Bennyhoff and Heizer 1958). In California, Dentalium beads date from A.D. 700 to A.D. 1500 (Bennyhoff and Heizer 1958), and possibly as early as 200 B.C. (O'Connell and Ambro 1968).

Chapter 6. ORGANIC REMAINS
by Dave N. Schmitt

Over one hundred mammal bones, a desiccated lizard, eight carnivore scats, a hank of human hair, and a cactus fruit were recovered from test excavation at South Pulpit Shelter. Analysis of these non-artifactual organic remains addresses depositional processes, mammalian site use, and prehistoric subsistence.

Faunal Remains

A total of 111 bones was recovered from the site. Twenty-six specimens (23.4%) were identified (some tentatively) taxonomically to the species and/or genus level. The following is a descriptive summary of the species and anatomical elements represented. Vertical distributions and abundances of taxonomically identified bone, and specimens identified to animal size class, are presented in Table 14.

Class Mammalia - Mammals

Order Rodentia - Rodents

Family Sciuridae - Squirrels

Spermophilus sp.

Ground Squirrels

Material: One mandible, two mandible fragments, three maxillae (6 specimens).

Remarks: Two species of ground squirrel are extant in the project area: the antelope ground squirrel (*Ammospermophilus leucurus* [subgenus]) and Townsend's ground squirrel (*Spermophilus townsendii*) (Hall 1946).

Order Lagomorpha - Rabbits, Hares, and Pikas

Family Leporidae - Rabbits and Hares

cf. *Lepus californicus*

Black-tailed Jackrabbit

Material: One rib fragment, one vertebra fragment (2 specimens).

Lepus californicus

Black-tailed Jackrabbit

Material: One mandible fragment, two proximal ulnae, one proximal radius, one radius shaft, one proximal tibia, one cervical vertebra fragment, one lumbar vertebra, one metapodial, one calcaneum, one phalange (11 specimens).

Remarks: The black-tailed jackrabbit is the only large rabbit currently found in the project area (Hall 1946).

Order Carnivora - Carnivores

Family Canidae - Wolves, Dogs, and Foxes

cf. *Canis latrans*

Coyote

Material: Two canines (2 specimens).

Remarks: Coyotes are ubiquitous in Nevada and throughout most of western North America (e.g., Hall 1946).

Order Artiodactyla - Artiodactyls (Even-toed Ungulates)

Family Bovidae - Bovids

Ovis canadensis

Mountain Sheep

Material: Five molar fragments (5 specimens).

Remarks: Probably representing a single tooth, all five specimens are robust, hypsodont (i.e., pillared) molar fragments from level 6 in unit 4.

Class Reptilia - Reptiles

Order Squamata - Lizards and Snakes

Family Iguanidae - Iguanid Lizards

Sceloporus sp.

Spiny Lizard

Material: One complete desiccated individual

Remarks: This specimen compares favorably with the western fence lizard (Sceloporus occidentalis) illustrated in Stebbins (1966), but may represent a sagebrush lizard (S. graciosus).

Table 14. Number of Identified Faunal Specimens per Taxon by Level at South Pulpit Shelter.

	Level 1	2	3	4	5	6	7	8	9	3-7*	Total
Lepus californicus	-	1	2	3	3	2	-	-	-	-	11
cf. Lepus californicus	1	1	-	-	-	-	-	-	-	-	2
Spermophilus sp.	-	3	-	-	-	1	1	1	-	-	6
cf. Canis latrans	-	-	-	-	-	1	-	-	1	-	2
Ovis canadensis	-	-	-	-	-	5	-	-	-	-	5
Sceloporus sp.							(1)				-
Size Class II	1	-	-	2	2	-	1	-	1	-	7
Size Class III	2	1	13	1	7	7	2	1	1	1	36
Size Class IV	-	-	-	-	1	1	-	-	-	-	2
Size Class V	5	4	8	6	2	4	7	1	-	-	37
Size Class X	-	-	-	-	-	2	1	-	-	-	3
Total	9	10	23	12	15	23	12	3	3	1	111

* Unit 2 pedestal clean-up
( ) Complete individual

Zooarchaeological analyses of fauna from dry caves and rockshelters commonly are oriented toward identifying the various taxa in the site and addressing paleoenvironmental issues through the analysis of taxonomic presences and abundances (e.g., Grayson 1983). While these types of analyses are important, they tell us little about taphonomic mechanisms responsible for the accumulation of fauna, particularly when inferring human subsistence (cf. Lyman 1982). Analysis of faunal remains recovered from South Pulpit Shelter focused also on documenting bone damage in an attempt to distinguish human food refuse from bone deposited by terrestrial carnivores and other non-human agencies.

Bones can be incorporated into archaeological deposits by numerous processes, including raptor pellets, carnivore scavenged/transported bone, natural mortality of an individual, scatological remains, packrat collecting behavior,

and human subsistence activities (e.g., Andrews and Evans 1983; Bonaccorso and Brown 1972; Dodson and Wexlar 1979; Juell and Schmitt 1985; Kent 1981; Thomas and Mayer 1983). Caves and rockshelters are particularly rich in faunal accumulations because they commonly are utilized and/or occupied by rodents, carnivores, raptors, and people. At South Pulpit Shelter, partially digested bone (scat bones) and human subsistence bone refuse were identified.

Comparative studies of Great Basin coyote (Canis latrans) feces (Dansie 1984; Juell and Schmitt 1985) indicate that scat bones are polished characteristically, and are rounded, pitted, and/or stained by digestive processes. Specimens identified as scat bones in the recovered faunal assemblage had to possess at least two of these characteristics.

Fifty-nine scat bones (53% of the collection) were identified (Table 15). Due to enhanced preservation (i.e., dry deposits), diagnostic attrition is particularly evident on these specimens. Scat bones were recovered throughout the deposits in the shelter, from 10 cm to 90 cm below surface. Similar to scat bones reported from open sites in the western Great Basin (Budy and Schmitt 1987; Schmitt 1986a), the assemblage is dominated by squirrel and rabbit size bone (97%), while larger mammals are represented by two specimens. A small concentration of scat bones (N=15) was recovered from level 3 in Unit 1, probably representing a single disaggregated scat. Complete and partial carnivore feces also were recovered (see below).

Further evidence of carnivore activity at the shelter is evident in the recovery of gnawed bone (Table 15). Five specimens (four Artiodactyl long bone fragments and one jackrabbit proximal ulna) display tooth punctures or furrowing characteristic of carnivore gnawing (Haynes 1980, 1983). These specimens probably represent prey bones, but may represent human subsistence refuse scavenged by carnivores subsequent to human site occupation.

Culturally modified bone is more difficult to recognize. Because recognition of many bone modifications is ambiguous due to our taphonomic naivete, indicators of "cultural" bone are notoriously difficult to identify; numerous taphonomic agencies can produce marks on bone similar to those produced by humans during animal butchery and the utilization of bone as tools (e.g., Lyman 1984; see especially Lyman 1987).

At South Pulpit Shelter, the identified cultural bone assemblage consists of two bone flakes. Both specimens (1003-4 and 4007-13) were produced by hammerstones striking exterior surfaces; platforms are on exterior surfaces and bulbs of

percussion are within the medullary cavities. Carnivores can produce similar flakes during feeding, but the present specimens lack characteristics (e.g., tooth marks) indicative of carnivore damage. Bone flakes can be produced during animal disarticulation (Lyman 1978; Schmitt 1986b) or marrow extraction (e.g., Binford 1978, 1981). Spirally fractured Artiodactyl (Class V) long bones in the assemblage may also represent subsistence refuse (N=4), but display no evidence of cultural utilization.

Table 15. Frequency and Attributes of Faunal Remains by Excavation Unit

	Unit 1	Unit 2	Unit 3	Unit 4	Total
Total No. Bones	51	6	21	33	111
Weight (gm)	23.3	8.3	8.1	25.3	65.0
No. Scat Bones	35	0	16	8	59
% Scat bones	69	0	76	24	53
Carnivore-gnawed Bones	0	0	2	3	5
Bone Flakes	1	0	0	1	2

In sum, most faunal remains from test excavations at South Pulpit Shelter were deposited by non-human processes, particularly terrestrial carnivores. Woodrat (<u>Neotoma</u> sp.) activity in the shelter also may be responsible for faunal accumulation and dispersal of other cultural items. Virtually all studies examining woodrat (packrat) behavior describe bone as an item collected and utilized in woodrat house construction (e.g., Bonaccorso and Brown 1972; Wells 1976). Woodrat houses are abundant at South Pulpit Shelter, especially in the inner chambers.

<u>Scatological Remains</u>

Eight carnivore scats were recovered from test excavations at South Pulpit Shelter (Table 16). Specimens were identified as carnivore droppings on the basis of size and the presence of matted hair and fragmented bone visible on outer surfaces. Most appear to be coyote scats (<u>Canis latrans</u>), but bobcat (<u>Lynx rufus</u>) scats also may be present. Because most specimens are fragmented, some bone and hair have been incorporated in the archaeological deposits through partial disaggregation. Informal inspection of bone visible

on outer and broken surfaces show size and attrition to compare favorably with identified scat bones in the faunal assemblage.

Table 16. Attributes of Scatological Remains

Specimen No.	Species	gms Weight	mm Max. Diameter
1001-3	cf. Coyote	7.3	17.6
1003-5	Carnivore	0.4	-
1004-6	Coyote	5.1	20.3
1005-14	Coyote	21.5	23.8
1008-4	Coyote	13.4	22.4
3002-2	Coyote or Bobcat	12.1	16.4
4003-3	Coyote or Bobcat	6.8	16.2
4004-7	Coyote	6.0	21.9

The occurrence of mountain sheep (Ovis canadensis) and woodrat (Neotoma sp.) are also represented by fecal remains. Woodrat droppings were particularly abundant in the upper deposits of the shelter and inner chamber, while discrete "pockets" of sheep dung were encountered 50 cm to 75 cm below the surface in units 4 and 2 (see Figure 16).

Hair

A hank of human hair was recovered from level 7 in Unit 4. The hair is thick and coarse, and is black in color with a slight reddish-brown tint. Some strands appear to be cut; lengths range from approximately 10 cm to 12 cm. The occurrence of human hair in the site can be attributed to grooming activity (i.e., a haircut) performed at the site, or it may indicate a burial in the shelter/cave disturbed by burrowing rodents (cf. Schmitt 1987).

Cactus Fruit

Exhibiting remarkable preservation, a single cactus fruit (tuna) was recovered from 80 cm below the surface in Unit 4 (specimen 4008-3). Its clavate shape and overall size compare favorably with the Devil's cactus (Opuntia parishii or O. pulcella) illustrated in Munz and Keck (1973). The outer surface is charred, probably representing intentional burning

to remove needles and bristles before consumption (Steward 1941). Although assessing season of site occupation without multiple indicators is risky (c.f. Monks 1981), this specimen suggests a mid-summer occupation of the shelter at the time of its deposition.

The tuna measures 89.0 mm in length, has a maximum diameter of 32.5 mm, and weighs 36 grams.

Chapter 7. STRATIGRAPHY AND ARTIFACT DISTRIBUTIONS
by Michael P. Drews

Four test pits were excavated at South Pulpit Shelter (see Figure 1). Units 1, 2 and 4 form a 1 by 3 meter trench in the western, open portion of the shelter, while Unit 3 was placed inside the re-entrant. Unit 3 was excavated to a depth of 60 cm below surface, units 1 and 2 to 100 cm, and Unit 4 to 150 cm.

In order to further explore depth of deposit, three 6 inch auger holes were bored through the 150 cm level of Unit 4. In each auger hole, a large obstruction (probably rock roof fall) was encountered at 30 to 40 cm below the level of the unit (180-190 cm below surface).

Stratigraphy

The deposit revealed in the shelter trench (units 1, 2, and 4) consists of similar strata of gravelly sand, grading from sandy loam at depth to cobbly medium sand in the upper levels (Figure 17). Four horizons are identified, each relating to slightly different colluvial events of depositional intervals. For descriptive purposes, soil samples were taken of several horizons within the profile.

At 90 cm below surface, the lowest horizon (1) is characterized by gravelly, sandy loam; its extent remains unknown. A wedge of very gravelly sand lying near the top of this horizon pinches to the south. Horizon 1 contains decreasing amounts of cultural debris and very little organic material.

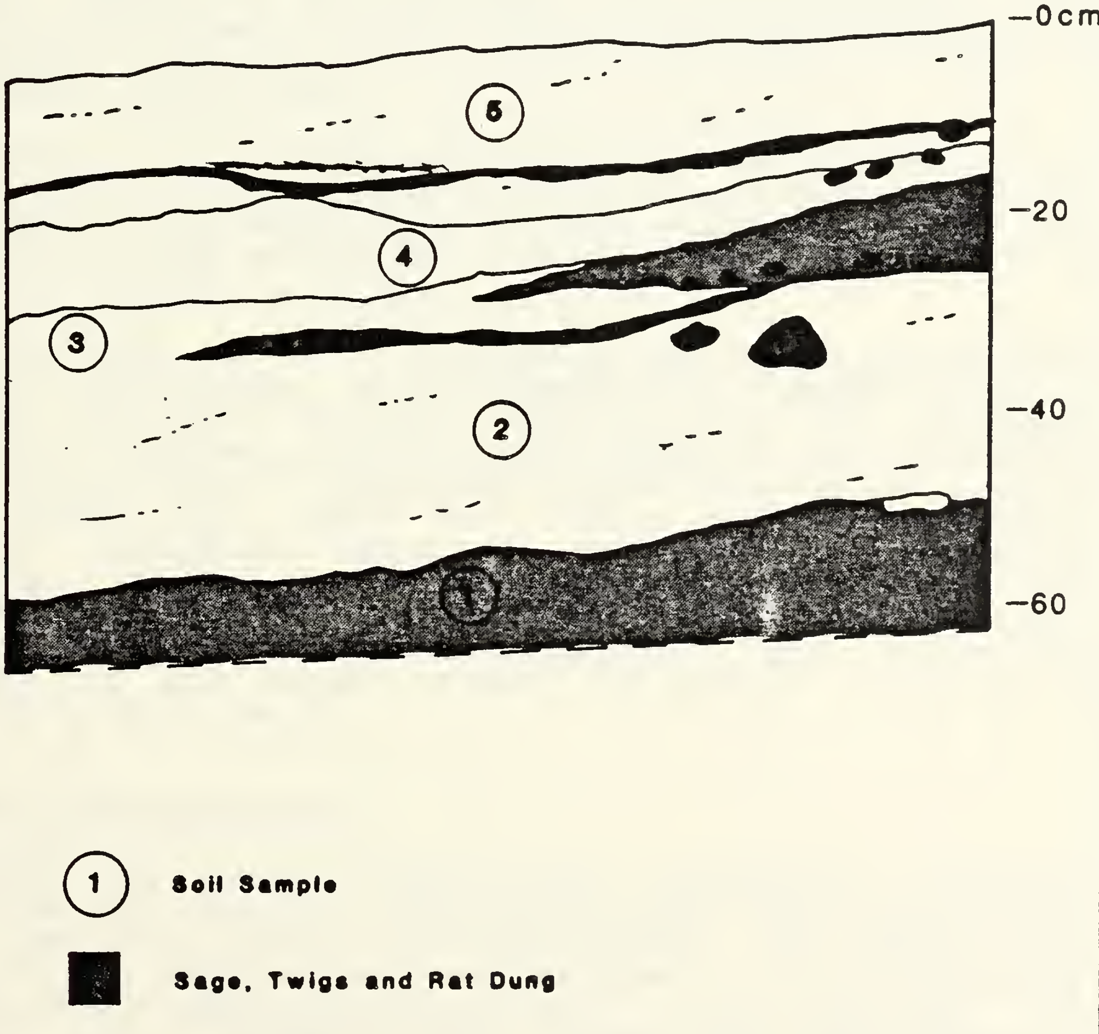
Above that, horizon 2 is a 70 cm thick band of gravelly sand. It is the most complex of the stratigraphic units, containing two hearth features, several lenses of sage and grass, charcoal, and a small basin-shaped depression containing sheep dung and burned organics. The upper portion of this horizon, approximately 20 cm thick and lying 40 cm below surface, produced the most artifacts of the cultural levels. A lens of matted sage bark and twigs (perhaps the lowest cultural feature), lies at the base of this horizon immediately atop the gravel lens in horizon 1. This material produced a ^{14}C date of 3150 $\pm$110 B.P. (Beta 23438). The sage mat appears to overlie the end of a wedge-shaped layer (thickening to the south) that contains Feature 1, ^{14}C dated to 1800 $\pm$60 B.P. (Beta 23437). At face value, this suggests a stratigraphic reversal. Consider, however, that the sage mat

Figure 17. East Wall profile, Unit 1, 4, 2 trench.

Soil Description

Sample 1 Horizon 1 130 cm	2.5 Y 7/4, Pale Yellow; Gravelly Very Fine Sandy Loam; Structureless, massive, loose (dry), non-sticky, non-plastic, weakly cemented.
Sample 2 Horizon 1 90 cm	2.5 Y 7/4, Pale Yellow; Very Gravelly Sand; Structureless, massive, loose (dry), non-sticky, non-plastic, weakly cemented. Gravels to 60 mm diameter.
Sample 3 Horizon 2 66 cm	2.5 Y 7/4, Pale Yellow; Gravelly Medium Sand; Structureless, massive, loose (dry), non-sticky, non-plastic, weakly cemented.
Sample 4 Horizon 3 35 cm	2.5 Y 7/2, Light Gray; Gravelly Sand; Structureless, massive, loose (dry), non-sticky, non-plastic, weakly cemented. Few organics.

26Hu2472 North Wall Profile, Unit 3



is lower, in absolute terms, than Feature 1. The sage mat could have been deposited prior to Feature 1 and we easily could have missed subtle stratigraphic boundaries between the two because of obscuring dust and poor light in the trench. The boundary described in the stratigraphic drawing by the upper limits of the sage mat and extending upwards toward the south, could be an unconformity produced by prehistoric cultural activities.

Sage bark, twigs, and rat dung (horizon 3) are dispersed throughout most of the the upper 40 cm of the deposit. Considerable roof fall and talus were encountered near the top of this horizon, but the matrix remains essentially the same. Cultural materials are somewhat limited throughout this horizon; it represents a major intrusion of colluvium into the shelter area. Feature 2 in horizon 3 produced a ^{14}C date of 700 $\pm$90 B.P. (Beta 23436).

Horizon 4 is limited to the southernmost portion of the trench profile and represents current colluvial deposition. It consists of a small wedge of rocky colluvium within the upper 10 cm of the deposit but, unlike horizon 3, contains no cultural or organic materials.

The profile of Unit 3 is characterized by structureless, gravelly, coarse sand, interfingered with discrete layers of rat dung and nest material (Figure 18). The uppermost portions of this deposit are loosely compacted, with increased compaction at depth. Beginning at about 30 cm below surface, clasts within the matrix are coated with salt crystals (probably potassium chloride) suggesting heavy rodent intrusion. Nearly 25% of the deepest organic layer is rat dung and twigs. Unit 3 was basically devoid of cultural material; only one flake was recovered. The texture and structure of the deposit in Unit 3 is similar to that of horizon 2 in the trench.

Sedimentological Analysis

Since the deposit showed little structural difference among observable strata, particle size analysis was performed on soil samples collected from each horizon. The samples were sifted through progressively smaller mesh, each corresponding to the grain sizes for gravel, sand, silt, and clay (see U.S.D.A. 1962). Sediment caught in each sieve was weighed to the nearest 0.1 gram and relative percentages calculated.

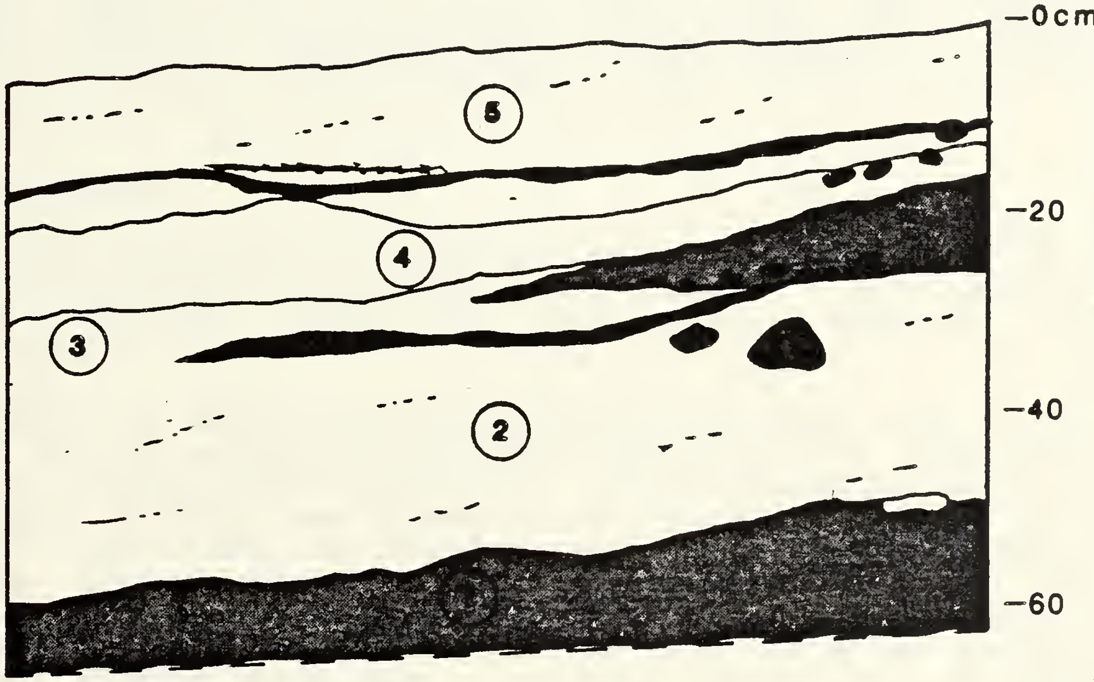
Figure 18. North Wall profile, Unit 3.

Soil Description

Sample 1 56 cm	7.5 YR 4/6, Strong Brown; Gravelly Coarse Sand, Loose Organic Material; Structureless, massive.
Sample 2 36 cm	2.5 Y 7/4, Pale Yellow; Gravelly Coarse Sand; Structureless, massive, loose (dry), non-sticky, non-plastic.
Sample 3 25 cm	2.5 Y 7/4, Pale Yellow; Gravelly Coarse Sand; Structureless, massive, slightly hard (dry), non-sticky, non-plastic.
Sample 4 20 cm	2.5 Y 7/4, Pale Yellow; Very Gravelly Coarse Sand; Structureless, massive, hard (dry), non-sticky, non-plastic.
Sample 5 8 cm	2.5 Y 6/4, Light Yellowish Brown; Gravelly Coarse Sand, stringers of rat dung and twigs; Structureless, massive, loose (dry), non-sticky, non-plastic.

26Hu2472

North Wall Profile, Unit 3



1 Soil Sample

Sage, Twigs and Rat Dung

Figure 19 graphs the results of the grain size analysis. In the Unit 1, 4, 2 trench (Figure 19, top) the gravel fraction present in the gravel wedge of horizon 1 is relatively high due to a large cobble in the sample; otherwise, the ogives represent a gradual increase in grain size as the horizons are deposited. This gradual increase reflects the depositional nature of the colluvial cone; smaller fines are carried to the toe, and as it advances, those are covered by increasingly larger sediments.

Unlike sediments in the exterior shelter trench, those from Unit 3 within the re-entrant (Figure 19, bottom) show relatively little variation. Grain size becomes somewhat smaller towards the surface of the unit suggesting that colluvial deposition was not as active after the deepest sediments (30-60 cm below surface) were laid down. This probably coincides with the burial of the southern overhang and closure of the re-entrant by colluvium.

Depth of Deposit

Safety considerations dictated that excavation within the shelter be terminated at a depth of 1.5 meters. As a result, a full vertical profile of the shelter deposits is hypothesized.

Figure 20 depicts profiles of the colluvial cone, the interior shelter surface including excavation units, and the shoreline of the Lahontan maximum. As discussed previously, the shelter probably was formed by wave action eroding less resistant rock along the Lahontan maximum, some 13,000 years ago. We suspect that wave cutting may have produced an opening far more extensive than the shelter's present configuration suggests and, at the same time, kept the opening relatively free of colluvium. If true, the bottom of the original shelter, should be near the Lahontan maximum shoreline.

During the intervening 13,000 years, the shelter has filled gradually and been transformed by colluvial intrusions and by episodes of roof collapse. Roof fall is uncommon in the re-entrant, where the colluvium has effectively protected the shelter from weathering. In the more open shelter, however, roof fall apparently has been more extensive. The greater amount of roof fall in the shelter can be appreciated by continuing the trend of the re-entrant roofline westward into the shelter. The shelter roof is about 1.5 meters higher than that of the re-entrant, and large boulders litter the present shelter surface. Deposits too rocky to penetrate with

Figure 19. Grain size analysis. Unit 1, 4, 2 trench (top) and Unit 3 (bottom).

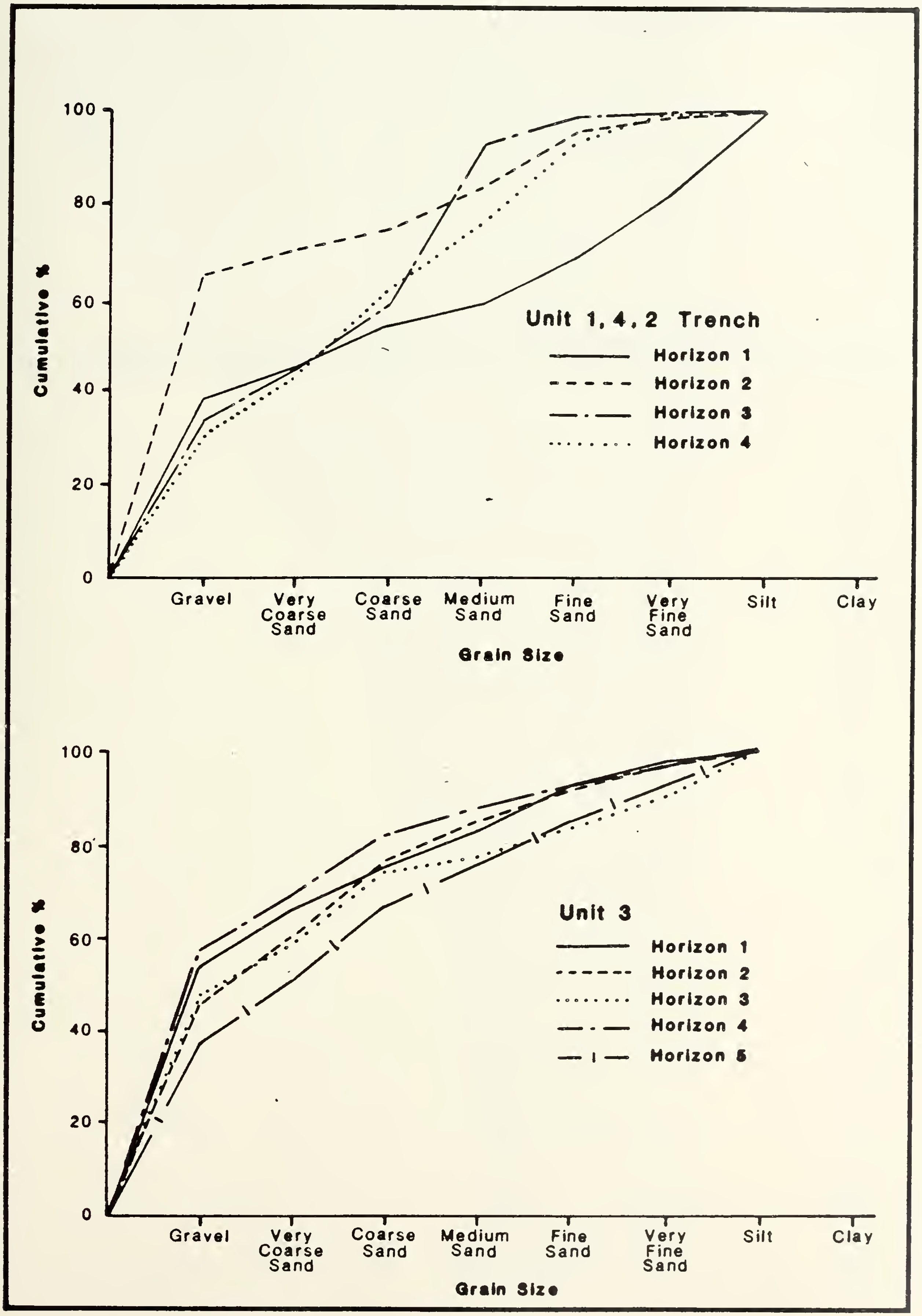
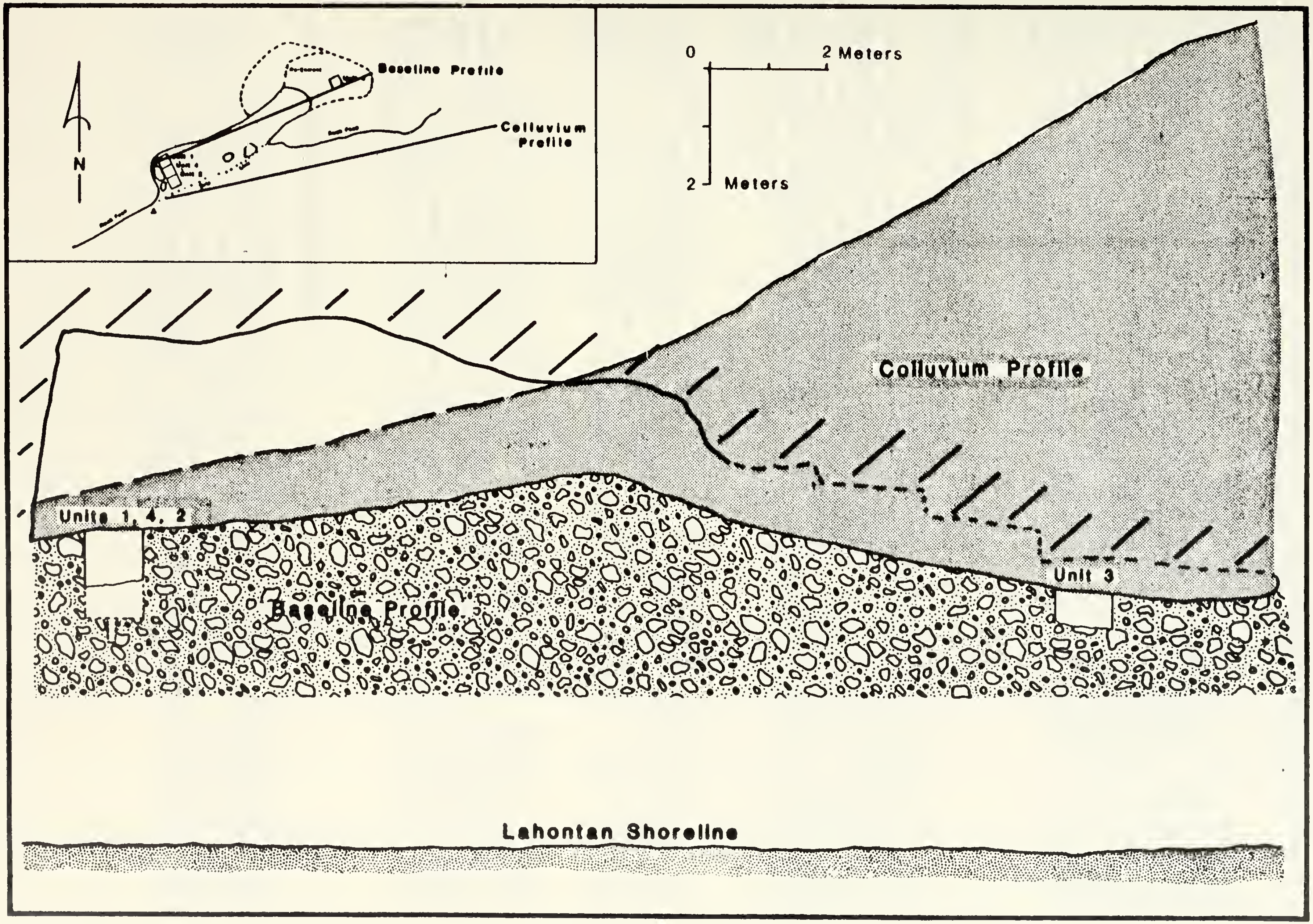

Cumulative %
100
80
60
40
20
0
Gravel
Very Coarse Sand
Coarse Sand
Medium Sand
Fine Sand
Very Fine Sand
Silt
Clay
Grain Size
Unit 1, 4, 2 Trench
Horizon 1
Horizon 2
Horizon 3
Horizon 4
Cumulative %
100
80
60
40
20
0
Gravel
Very Coarse Sand
Coarse Sand
Medium Sand
Fine Sand
Very Fine Sand
Silt
Clay
Grain Size
Unit 3
Horizon 1
Horizon 2
Horizon 3
Horizon 4
Horizon 5

Figure 20. West-east colluvial and baseline profiles at South Pulpit Shelter.



Baseline Profile
Colluvium Profile
N
0
2 Meters
2
Meters
Colluvium Profile
Units 1, 4, 2
Unit 3
Baseline Profile
Lahontan Shoreline

the soil auger were encountered at 180-190 cm below surface in Unit 4, suggesting a zone of possible roof fall below.

It is likely, then, that deposits in the shelter represent both periods of colluvial deposition and roof collapse. The depth of fill above the Lahontan shoreline varies from 5.5 meters (at the trench) to 4.5 meters in the re-entrant), with colluvium outside the shelter dripline adding at least another meter of fill. If the shelter began to be used by humans soon after the recession of Lake Lahontan, habitation debris could extend at least 6 meters below the present surface.

Cultural Features

Three features were recorded during excavation at South Pulpit Shelter, two in Unit 2 and one in Unit 4. Feature 1 is described as an oblong, charcoal-filled, shallow depression. It measures approximately 52 cm along its east/west axis and 30 cm north/south. Soil within this feature is ashy and contains abundant charcoal; the surrounding matrix is burned red. Feature 1 lies at a depth of 70-71 cm below surface (see Figure 17).

Feature 2 is a sage mat and organic layer lying within a cobble concentration in Unit 2. Stringers of rat dung are found in the sage bark and the feature is most likely a rat nest. It is located 10 to 20 cm below surface, associated with strata bearing similar organic components (see Figure 16).

Feature 3 is a burned area lying 40-46 cm below surface in Unit 4 (see Figure 17). It is slightly basin-shaped, measuring 60 cm along its north/south axis and extends 50 cm west of the east wall unit. Feature 3 overlies a burned sheep dung layer and underlies the upper sage and rat dung stratum. Several burned rocks and chunks of chert are associated with this feature.

Artifact Distributions

Nearly one-half (48%) the tools recovered from excavation at South Pulpit Shelter were from Unit 4; the remainder are split almost evenly between units 1 and 2 (Figure 21). Bifaces and flake tools are the dominate tools type in each unit. Twenty-one bones, most of which are not cultural, and one flake was recovered from Unit 3.

Figure 21. Stone tool frequencies by excavation unit/level at South Pulpit Shelter.

Unit 1

Level	BC	CH	BF	FT	PT	GS	Total
1							
2			1		1		2
3			1				1
4			2				2
5	1		4	4		1	10
6			1	4		1	6
7			3	1	1		5
8			1	1			2
9			1				1
10			1				1
Total	1	0	15	10	2	2	30

Unit 4

Level	BC	CH	BF	FT	PT	GS	Total
1				1		1	2
2							
3							
4				2	1		3
5			1	1			2
6		1	16	12	2	5	36
7	1		5	7	1	1	15
8			1				1
9							
10				1			1
Total	1	1	23	24	4	7	34

Unit 2

Level	BC	CH	BF	FT	PT	GS	Total
1						1	1
2				1			1
3							
4			1	1			2
5		1	8	2	1		12
6			8	4		1	13
7			1				1
8			1				1
9			1	1			2
10						1	1
Total	0	1	20	9	1	3	60

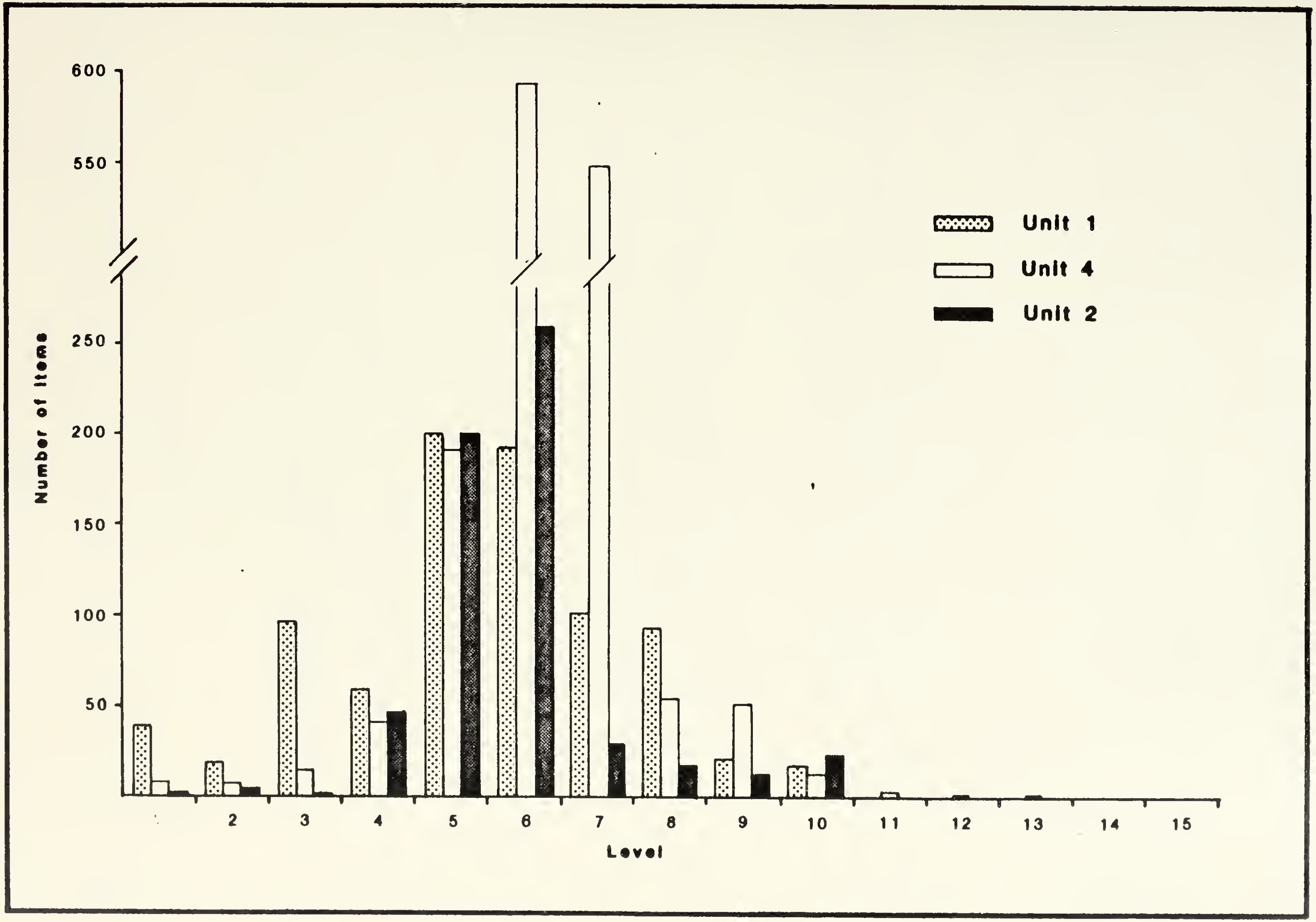
BC Battered Cobbles
CH Choppers
BF Bifaces
FT Flake Tools and Fragments
PT Projectile Points and Fragments
GS Groundstone

Debitage frequencies exhibit a similar distribution, with most items recovered from Unit 4 (Figure 22). Interestingly, the upper levels of Unit 1 contained relatively higher frequencies of debitage, again suggesting encroachment of the colluvial cone.

Vertically, the highest artifact frequencies were encountered between 40 and 70 cm below surface, which is roughly defined by the series of organic mats and charcoal concentrations lying below the upper sage and rat dung deposit. Typable projectile points from the zone rich in cultural material suggest occasional occupations between 1500 B.C. and historic contact. No cores or tools were recovered below 100 cm and only a few flakes were present between 100 and 130 cm (see Figure 22).

The paucity of cultural materials in Unit 3 corresponds with its stratigraphic position relative to that of Trench 1, 4, 2. Colluvial intrusion has effectively sealed the re-entrant, leaving its surface approximately 1 meter below that of the trench surface. The surface of Unit 3, then, roughly corresponds to the deepest levels of Trench 1, 4, 2 (100-130 cm B.S.), where the artifact frequency is similar to that in Unit 3.

Figure 22. Raw debitage frequencies by excavation unit/level in the unit 1, 4, 2 trench.


Unit 1
Unit 4
Unit 2
Number of Items
600
550
250
200
150
100
50
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Level

Chapter 8. CONCLUSIONS AND RECOMMENDATIONS
by Dave N. Schmitt

Subsurface test excavation and subsequent analysis of materials recovered from South Pulpit Shelter were conducted to assess the research value of the site and its eligibility for nomination to the National Register of Historic Places. The following discussion draws conclusions based on these analyses and presents selected site management recommendations.

Conclusions

Field and laboratory analyses were directed toward checking for the presence of buried cultural remains and paleoenvironmental data, obtaining materials suitable for radiocarbon dating, observing the stratigraphic record and its potential for containing separate occupational events, and inferring site function.

Cultural and Paleoenvironmental Data

While few artifacts were present on the surface at South Pulpit Shelter, subsurface testing revealed intact cultural deposits rich in lithic and organic artifacts as well as floral and faunal remains. Due to the limited scale of test excavations conducted at the shelter, a large quantity and variety of paleoenvironmental data were not recovered. Nevertheless, ample indicators of past environmental conditions in the Black Rock Desert were observed. Detailed analysis of faunal remains, plant macrofossils, and pollen grains contained in the dry deposits will likely provide valuable paleoenvironmental and biogeographical data, as will analysis of woodrat midden present in the re-entrant (e.g., Thompson and Hattori 1983). Future analyses of culturally deposited organic remains will contribute to a greater understanding of economically important animal and plant resources in the region. In addition, climatic change can be addressed by the future observation of changes in modes of deposition in the shelter (i.e., aeolian, debris flow, colluvial cone, roof fall).

Chronology

Charcoal and other organic remains are abundant at South Pulpit Shelter. Based on content (i.e., weight) and stratigraphic location, three samples were dated by

radiocarbon methods. The dates (Appendix A) indicate the shelter was occupied variously between 3200 B.P. and 600 B.P. Figure 23 presents the vertical and horizontal distribution of radiocarbon dates and projectile points in the Unit 1, 4, 2 trench. Although ^{14}C dates bring into question the stratigraphic position of the lower sage mat, feature 1 and an Elko Series point above a Rosegate point in Unit 4, the data seem to indicate the potential for a well ordered stratigraphic sequence.

The presence of a Great Basin Stemmed point and other possible pre-Archaic artifacts in South Pulpit Shelter suggest scavenging of artifacts from early sites in the vicinity by Archaic shelter occupants. The earliest absolute date at South Pulpit Shelter was recovered from a sage mat 90 cm below the surface in Unit 4 (3150 $\pm$110 B.P., Beta-23438). Although sparse, cultural materials were recovered in association with the organic material. This mat represents the oldest occupation in the excavated deposits.

A date of 1800 $\pm$60 B.P. (Beta-23437) was derived from feature 1 in Unit 2. This date is slightly older than the age of a Rosegate Series point (1500-800 B.P.) found 10 cm above the feature (Figure 23; Unit 2). An Elko-eared point recovered above a Rosegate point in Unit 4 shows evidence of re-working and use as a scraping tool; it too probably represents an item scavenged by later site occupants (see chapters 5 and 7). The most recent date (700 $\pm$90 B.P., Beta 23436), a composite charcoal sample from feature 2 in Unit 2, corresponds with a Desert Side-notched point recovered from the top of soil Horizon 2 (Figure 23).

In sum, radiocarbon dates and diagnostic artifacts indicate occupation of South Pulpit Shelter over the past 3200 years. The high density of cultural material in levels 5 through 7 (see figures 21 and 22) indicate site use was most intensive between ca. 1700 and 800 years ago.

Obsidian Sourcing

Sourcing analyses (Appendix B) identified two distinct obsidian types at South Pulpit Shelter: Majuba Mountain (ca. 30 km southeast of the site) and Pinto Peak (ca. 60 km northwest of the site). Based on characteristics present in the sourced specimens (e.g., color, translucency, and banding), we identified six additional specimens as Majuba Mountain obsidian and one as Pinto Peak. Figure 24 illustrates the distribution of identified specimens in the Unit 1, 4, 2 trench. Although the sample is small, the vertical distribution of the two types is somewhat different.

Figure 23. Location of radiocarbon dates and diagnostic projectile points in the Unit 1, 4, 2 trench.

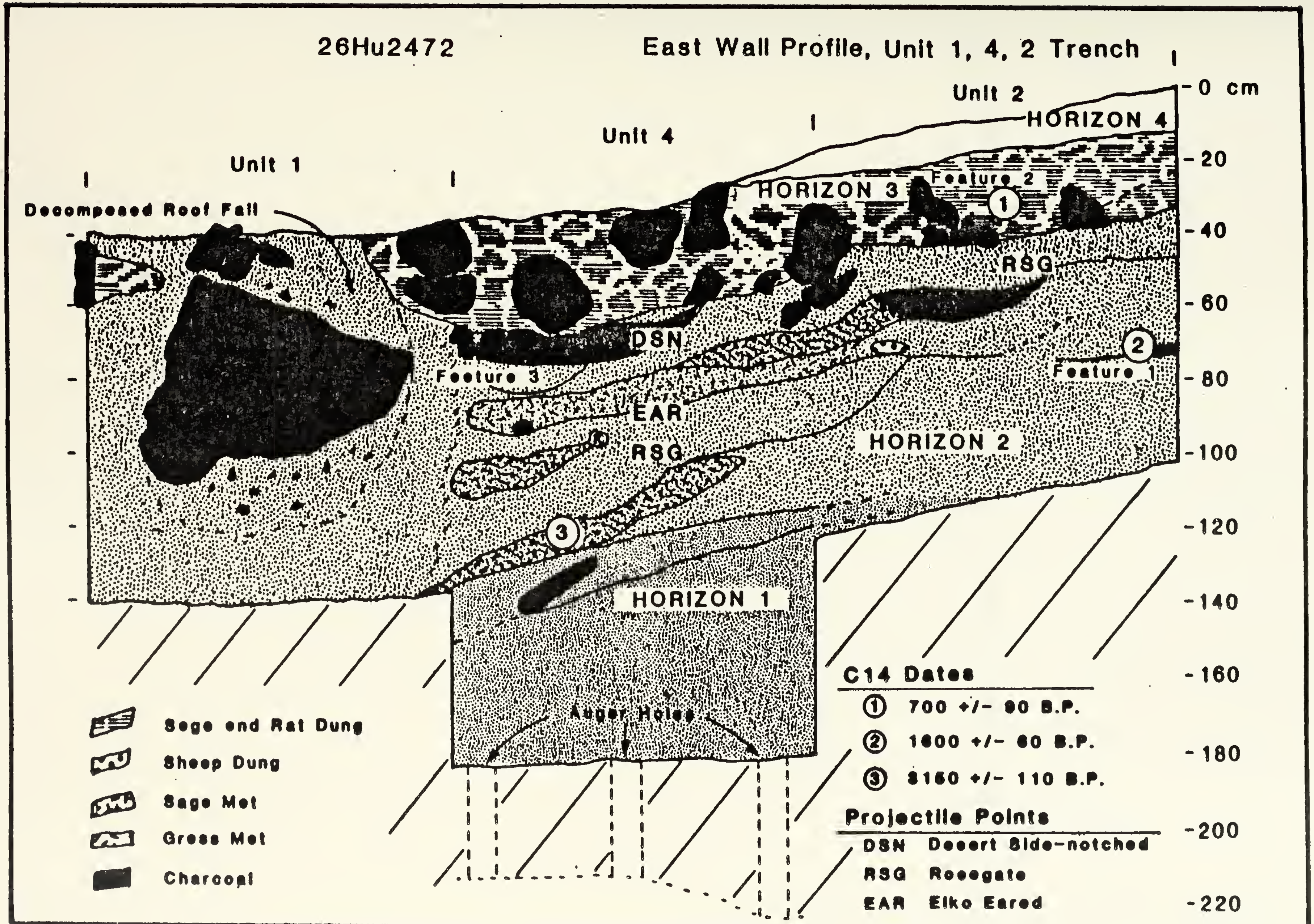
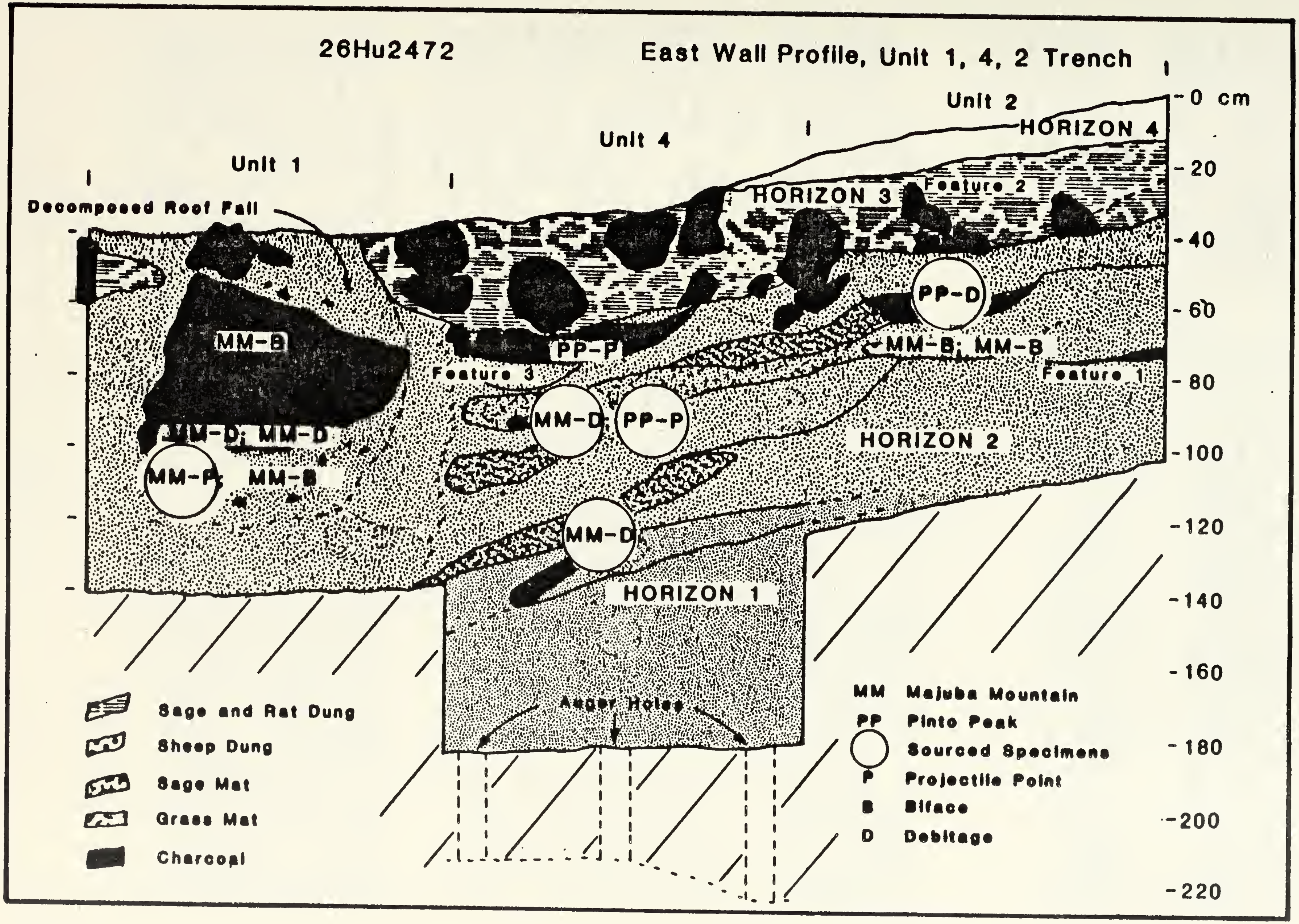

26Hu2472
East Wall Profile, Unit 1, 4, 2 Trench
Unit 1
Unit 4
Unit 2
Decomposed Roof Fall
HORIZON 4
HORIZON 3
HORIZON 2
HORIZON 1
Feature 1
Feature 2
Feature 3
DSN
EAR
RSG
Auger Holes
0 cm
-20
-40
-60
-80
-100
-120
-140
-160
-180
-200
-220
Sage and Rat Dung
Sheep Dung
Sage Mat
Grass Mat
Charcoal
C14 Dates
1 700 +/- 90 B.P.
2 1600 +/- 60 B.P.
3 3150 +/- 110 B.P.
Projectile Points
DSN Desert Side-notched
RSG Rosegate
EAR Elko Eared

Figure 24. Location of identified obsidian types in the Unit 1, 4, 2 trench.


26Hu2472
East Wall Profile, Unit 1, 4, 2 Trench
Unit 1
Unit 4
Unit 2
Decomposed Roof Fall
HORIZON 4
HORIZON 3
HORIZON 2
HORIZON 1
Feature 1
Feature 2
Feature 3
MM-B
MM-D; MM-D
MM-P; MM-B
PP-P
MM-D
PP-P
MM-D
PP-D
MM-B; MM-B
Auger Holes
0 cm
-20
-40
-60
-80
-100
-120
-140
-160
-180
-200
-220
Sage and Rat Dung
Sheep Dung
Sage Mat
Grass Mat
Charcoal
MM Majuba Mountain
PP Pinto Peak
Sourced Specimens
P Projectile Point
B Biface
D Debitage

Majuba Mountain obsidian (represented by tools and debitage) is most abundant, occurring at depths from 30 cm to 90 cm below the surface. Pinto Peak obsidian occurs 30 cm to 60 cm below the surface, and is represented by a biface thinning flake, an Elko eared projectile point, and a Desert Side-notched projectile point.

Identified obsidian types at South Pulpit Shelter represent the first sourced specimens from a Black Rock Desert site. Future obsidian studies will contribute to a greater understanding of prehistoric subsistence patterns and settlement in the region.

Site Function

Archaeological sites differ with regard to their place in past settlement and subsistence patterns. Numerous theoretical models of hunter-gatherer subsistence and economy (Binford 1980; Thomas 1983b; Zeier and Stornetta 1984; see also Elston and Budy 1987; Elston and Juell 1987) have been developed that relate archaeological site content to function.

The 3141 cultural items recovered from South Pulpit Shelter represent a variety of artifact classes. The stone tool and debitage assemblages indicate that the manufacture of bifaces from locally available chert was a significant activity. Evidence of this activity is particularly abundant in levels 5-7 in the unit 1, 4, 2 trench (see figures 21 and 22). While biface manufacture appears to have been paramount, other tasks were performed during shelter occupation. Fabricating tools (i.e., tools used to make other artifacts) are present, including battered cobbles, choppers, and a graver. Projectile points and an arrow mainshaft represent food acquisition tools. Further, ad hoc general utility tools which can be used for a variety of tasks are abundant (e.g., utilized and modified flakes).

Groundstone present in the collection, suggests that plant processing occurred on site and some expended grinding implements were recycled as hearth rocks and/or boiling stones. The recovery of a charred cactus fruit suggests that local plant resources were extracted and brought to the site for preparation/processing. Although most of the faunal specimens were deposited by non-human agencies, hammerstone-produced Artiodactyl bone flakes suggest some large animal resources were processed at the site. Small mammals (e.g., rabbits) may have been exploited locally as a food resource, but the faunal data display no evidence of it.

In sum, the recovery of numerous representatives of several artifact classes in association with residential equipment (e.g., hearth features) indicates that South Pulpit Shelter was used by Late Archaic people as a short-term base camp. Site use focused predominantly, but not exclusively, on the acquisition and processing (heat-treating and reduction) of local chert. Other activities included the fabrication of non-lithic tools and daily subsistence activities related to food acquisition and processing.

Recommendations

National Register Evaluation

The National Historic Preservation Act of 1966, as amended, authorized the Secretary of the Interior to maintain the National Register of Historic Places. The National Register is employed herein as a means of identifying historic and prehistoric properties worthy of management consideration. Based on data retrieved from test excavations at South Pulpit Shelter, the site merits National Register consideration, as discussed below.

South Pulpit Shelter represents the only documented rock shelter in the eastern Black Rock Desert with stratified deposits rich in artifacts. Untested lower deposits may yield valuable prehistoric and paleoenvironmental data dating to the late Pleistocene. Pre-Archaic and Early Archaic period sites occur in the region (Clewlow 1968; Hanes and McGuckian 1987), but few are known and they lack dry deposits common to caves and rockshelters. South Pulpit Shelter currently represents the only site in the region which may contain a stratified faunal, palynological, and plant macrofossil record dating to the terminal Pleistocene. Consequently, the site offers the possibility of a significant and regionally unique view of environmental conditions, human subsistence, and biogeography in the Black Rock Desert.

The variety and quantity of data present in the site is considerable. Aside from lithic tools and debitage, test excavations revealed perishable artifacts that can be particularly useful in identifying some aspects of site function and technology. For example, perishable artifacts associated with lakeside economies (e.g., tule decoys and nets) are quick to disintegrate in open sites (cf. Seck 1980), while stone tools indicative of lacustrine subsistence are rare (Rozaire 1963). Consequently, the presence of perishable artifacts contributes to the significance of South Pulpit

Shelter; the site contains a form of prehistoric subsistence and technological information not present at open sites in the eastern Black Rock Desert.

Test excavation at the shelter also discovered cultural features. Because they often contain refuse indicative of specific tasks performed at a site, analysis of materials recovered from features can be particularly useful in identifying human subsistence activities, duration of occupation, and site function. Further, by examining the distribution of features in a site, site structure and the identification/separation of occupational events can be recognized. South Pulpit Shelter demonstrates the ability to address these aspects of archaeological inquiry.

Subsurface testing confirms that the site contains a late prehistoric component dating to 700 B.P. and perhaps later. Because the majority of sites recorded in the region contain no evidence of occupation during this time (see Smith et al. 1983 and references therein), South Pulpit Shelter contains information relevant to late prehistoric subsistence and settlement in the Black Rock Desert. As Elston states,

> "the Trego Hot Spring Site (Seck 1980) and the Barrel Spring Site (Cowan 1972) were virtually unoccupied after about 900 B.P. In the case of Trego Hot Spring, this may have had to do with the change to hotter, drier conditions since occupations in the coppice dune sites on the Humboldt river, which should have been less sensitive to xeric climatic changes, intensified after 1500 B.P.
>
> Barrel Spring may have been abandoned because of changes in technology or trade patterns, which reduced the importance of biface production" (1982:198).

The post-900 B.P. occupation(s) at South Pulpit Shelter offers the potential for clarification of these issues.

Finally, site integrity, in terms of location, setting, and feeling, is exceptional. The present test notwithstanding, cultural deposits at South Pulpit Shelter are largely undisturbed. The shelter offers a pristine archaeological resource with the ability to address numerous research questions related to paleoenvironment, biogeography, lithic technology, and prehistoric human subsistence in the Black Rock Desert.

Site Management

Due to the nature of depositional processes at the site, the majority of deposits are well protected by colluvium. In particular, colluvium and woodrat accumulations have capped cultural deposits in the eastern portion of the shelter and its inner chamber(s). This was demonstrated archaeologically in Unit 3 where only one piece of debitage was recovered from 60 cm of excavated colluvial deposits; we suspect the lower deposits in the inner chamber contain cultural materials (see Chapter 7). The deposits (approximately 12 square meters) located east of the excavated trench are more vulnerable to impacts. While roof fall generated by nearby mining operations (i.e., blasting) might enhance site protection by protecting the deposits from vandalism, roof fall may have more negative effects, depending on the magnitude of the event. For instance, very large amounts of rock could compress organic layers and distort stratigraphic relationships. The impact of large individual rocks might churn the upper deposits. Moreover, evidence from James Creek Shelter (Elston and Budy 1987) suggests that isolated piles of roof fall provide cover and resting space for pack rats (*Neotoma* sp.) who then burrow into deposits from their new vantage point. Finally, catastrophic failure of the shelter ceiling would seal the site under tons of rubble; while this would prevent vandalism of the site, it also would render scientific investigation there impossible.

As at any archaeological site, vandalism will reduce the integrity of cultural deposits at South Pulpit Shelter. To minimize the effects of such activity in the future, we recommend the shelter be monitored periodically. If evidence of vandalism or looting is observed, sensitive deposits in the western portion of the shelter should be capped off with cement or the entire site sealed to prevent further destruction.

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APPENDIX A

Radiocarbon Analysis

BETA ANALYTIC INC.

RADIOCARBON DATING, STABLE ISOTOPE RATIOS, THERMOLUMINESCENCE, X-RAY DIFFRACTION
P.O. BOX 248113 CORAL GABLES, FLORIDA 33124 - (305) 667-5167

November 12, 1987

Dr. Robert G. Elston
Intermountain Research
c/o Bureau of Land Management
705 E. 4th Street
Winnemucca, Nevada 89445

Dear Dr. Elston:

Please find enclosed the results on the three charcoal and organics samples recently submitted for radiocarbon dating analyses. We hope these dates will be useful in your research.

Your charcoals were pretreated by first examining for rootlets. The samples were then given a hot acid wash to eliminate carbonates. They were repeatedly rinsed to neutrality and subsequently given a hot alkali soaking to take out humic acids. After rinsing to neutrality, another acid wash followed and another rinsing to neutrality. The organics sample, Beta-23438, did not received the alkali pretreatment step, as per instructions over the telephone. The following benzene syntheses and counting proceeded normally. Beta-23438 was given extended counting time to reduce the statistical error.

We are sending our invoice under separate cover. If there are any questions or if you would like to confer on the dates, my direct telephone number is listed above. Please don't hesitate to call us if we can be of help.

Sincerely yours,

Murry Tamers

Murry Tamers, Ph.D.
Co-director

P.S. I'm including some data sheets for future samples or to give to your colleagues that might need our service.

BETA ANALYTIC INC.
(305) 667-5167
P.O. BOX 248113
CORAL GABLES, FLA. 33124

REPORT OF RADIOCARBON DATING ANALYSES

Robert G. Elston

Intermountain Research

DATE RECEIVED: October 22, 1987

DATE REPORTED: November 12, 1987

BILLED TO SUBMITTER'S INVOICE NUMBER

LAB NUMBER	YOUR SAMPLE NUMBER	C-14 AGE YEARS B.P. ± 1σ
eta-23436	2003 - 8	700 +/- 90 BP
eta-23437	2007 - 1	1800 +/- 60 BP
eta-23438	4009 - 4	3150 +/- 110 BP

These dates are reported as RCYBP (radiocarbon years before 1950 A.D.). By international convention, the half-life of adiocarbon is taken as 5568 years and 95% of the activity of the National Bureau of Standards Oxalic Acid (original atch) used as the modern standard. The quoted errors are from the counting of the modern standard, background, and ample being analyzed. They represent one standard deviation statistics (68% probability), based on the random nature f the radioactive disintegration process. Also by international convention, no corrections are made for DeVries effect, eservoir effect, or isotope fractionation in nature, unless specifically noted above. Stable carbon ratios are measured on equest and are calculated relative to the PDB-1 international standard; the adjusted ages are normalized to -25 per mil arbon 13.

APPENDIX B

Obsidian Source Analysis

SONOMA STATE UNIVERSITY
ACADEMIC FOUNDATION, INC.

NTHROPOLOGICAL STUDIES CENTER
ULTURAL RESOURCES FACILITY
07 664-2381

November 13, 1987

Mr. Dave N. Schmitt
Laboratory Supervisor
Intermountain Research
Drawer 'A'
Silver City, NV 89428

Dear Mr. Schmitt:

On page two of this letter you will find a table presenting x-ray fluorescence (xrf) data generated from the analysis of five obsidian artifacts from South Pulpit Shelter (26HU2472), Humboldt County, Nevada. This research was conducted pursuant to your letter request of October 21, 1987 under Sonoma State University Academic Foundation, Inc. Account 6081, Job X87-72.

Laboratory investigations were performed on a Spectrace™ 5000 (Tracor X-ray) energy dispersive x-ray fluorescence spectrometer equipped with a Rh x-ray tube, a 50 kV x-ray generator, with microprocessor controlled pulse processor (amplifier) and bias/protection module, a 100 mHz analog to digital converter (ADC) with automated energy calibration, and a Si(Li) solid state detector with 150 eV resolution (FWHM) at 5.9 keV in a 30 mm^2 area. The x-ray tube was operated at 30.0 kV, .30 mA, using a .127 mm Rh primary beam filter in an air path at 200 seconds livetime to generate quantitative data for elements Zn - Nb. Iron vs. manganese (Fe/Mn) ratios were computed from data generated by operating the x-ray tube at 12.0 kV, .30 mA, with a .127 mm Al filter in a vacuum path at 200 seconds livetime. Data processing for all analytical subroutines is executed by a Hewlett Packard Vectra™ microcomputer, with operating software and analytical results stored on a Hewlett Packard 20 megabyte fixed disk. Trace element concentrations were computed from a least-squares calibration line established for each element from analysis of up to 25 international rock standards certified by the U.S. Geological Survey, the U.S. National Bureau of Standards, the Geological Survey of Japan, and the Centre de Recherches Petrographiques et Geochimiques (France). Further details pertaining to operating conditions and calibration appear in Hughes (1987).

Trace element measurements on the xrf data table (except Fe/Mn ratios) are expressed in quantitative units (i.e. parts per million [ppm] by weight), and matches between unknowns (artifacts) and known obsidian chemical groups were made on the basis of correspondences in diagnostic trace element concentration values (in this case, ppm values for Rb, Sr, Y, Zr and Fe/Mn ratios) that appear in Hughes (1985, 1986), Jack (1976), and Jack and Carmichael (1969), as well as unpublished data on northwestern Nevada obsidians. I use the term "diagnostic" to specify those trace

elements that are well-measured by x-ray fluorescence, and whose concentrations show low intra-source variability and marked variability across sources. In short, diagnostic elements are those whose concentration values allow one to draw the clearest geochemical distinctions between sources. Although Zn, Ga and Nb ppm concentrations also were measured and reported for each specimen, they are not considered "diagnostic" because they don't usually vary significantly across obsidian sources (see Hughes 1982, 1984). This is particularly true of Ga, which occurs in concentrations between 10-30 ppm in nearly all parent obsidians in the study area. Zn ppm values are infrequently diagnostic; they are always high in Zr-rich, Sr-poor peralkaline volcanic glasses, but they do not vary significantly between non-peralkaline sources in the study area. Likewise, Nb typically occurs in low concentrations in all volcanic glasses in the area.

Cat. Number	Trace Element Concentrations Zn*	Ga*	Rb*	Sr*	Y*	Zr*	Nb*	Fe/Mn	Obsidian Source (Chemical Type)
1007-1	71.1 ±9.1	14.4 ±6.9	141.6 ±5.6	113.9 ±3.5	19.3 ±2.8	162.9 ±4.8	10.8 ±3.7	36.1	MAJUBA MTN.
2005-15	165.1 ±7.8	21.5 ±4.2	185.2 ±5.5	6.3 ±3.2	77.5 ±2.5	501.9 ±6.4	30.7 ±3.5	69.2	PINTO PEAK
4006-3	159.2 ±8.0	23.8 ±4.1	186.8 ±5.5	6.7 ±3.1	71.4 ±2.5	499.5 ±6.3	26.7 ±3.5	68.6	PINTO PEAK
4006-30-1	65.7 ±8.6	18.4 ±4.9	167.1 ±5.6	126.0 ±3.5	21.0 ±2.7	169.7 ±4.8	10.2 ±3.7	35.7	MAJUBA MTN.
4009-2	60.7 ±7.8	18.6 ±4.3	155.2 ±5.4	123.1 ±3.3	23.5 ±2.5	166.1 ±4.6	10.3 ±3.5	33.3	MAJUBA MTN.

* Values in parts per million (ppm).

± Counting and fitting error uncertainty at 200 seconds livetime.

By comparing the data presented in the enclosed table with geological source reference sets (cited above), two distinct obsidian types can be identified in the assemblage-- Majuba Mountain (Hughes 1985: 333-336) and Pinto Peak (Hughes 1986: Table 9, Figure 9, 326). Primary deposits of Majuba Mountain glass occur ca. 30 km southeast of your site, while obsidian of the Pinto Peak geochemical type occurs ca. 60 km to the northwest. This latter distance estimate reflects only limited sampling and may be too great; other nodule occurrences of this geochemical type probably exist farther to the south, closer to HU2472.

I hope this information will help in your analysis of these site materials. Please contact me if I can be of further assistance.

Sincerely,

Richard Hughes

Richard E. Hughes, Ph.D.
Senior Research Archaeologist

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